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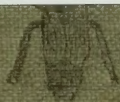
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BY
S. SIMMINS

*Author of "Direct Introduction of Queens"; "Simmins' Non-Swarming
System"; &c., &c.*

LONDON:
WOODFORD FAWCETT & Co.
36, 37 & 38, SOUTHAMPTON STREET, STRAND, W.C.

MAY, 1904.

PRINTED BY
WOODFORD FAWCETT & Co.,
36. 37 & 38, SOUTHAMPTON STREET, STRAND,
LONDON, W.C.



PREFACE.

IN placing this work before the reader, it has been the Author's intention to adhere strictly to the Science of Practical Bee-keeping, and to refer to the natural history of Bees only in so far that the one cannot be separated from the other in securing correct management. Those wishing to study the complete Anatomy and Physiology of these wonderful little insects, cannot do better than secure the works of Cheshire, Cowan, or Cook.

With few exceptions, the instructions contained herein will be confined to the Author's own experience, which has extended over thirty years of close observation. The reader will therefore have the benefit of a lengthened and varied experience, and by following one recognized system, there will be little possibility of the novice being confused by the usual multiplicity of ideas upon any one subject. The exceptions will be such matters as have a very important bearing upon the management of Bees. When the beginner has mastered the present system he will then be in a position to use his own judgment in selecting the good and leaving out the errors of others.

The Author does not hesitate to say that he has himself learned more by his failures than by success, in that where he has failed there has been a direct incentive to overcome such difficulty; and as the result, some of the

most important methods of management have been brought about, while time and labour-saving implements have been devised ; all of which will be found invaluable to the Apiarist of the present day.

It has been the Author's utmost endeavour to place the management of Bees before the novice and those who wish to become Bee-keepers, in as clear and straightforward a manner as possible. He knows full well how difficult it is for one more advanced in the science to fully expose every detail of procedure, and how equally difficult it is for those just entering the ranks to grasp many of the details which go to make up the grand total of success ; hence the reason why some apparently simple matters are gone into at length, that the learner may profit by the writer's own earlier experiences—in some cases, costly experiments and failures.

With regard to the foregoing it is hoped that those who are more advanced will not be wearied by that which is given for the benefit of others who have not much knowledge of the subject, remembering that we all have been in need of just such teaching. At the same time, the Author trusts the expert will find some things not before known to the bee-world, and which he will be willing to admit go far towards the economic production of honey ; and, moreover, constitute the very "pith" of practical bee-keeping.

It will be asked : "What are the profits of Bee-keeping ?" Many consider that there is a fortune in it, but this is not so. All may gain health and pleasure in following the study of this, the most remarkable creature in the insect world, but the number who make a profit out of this occupation will be limited to those only who have special qualifications, and are able to give the subject close study and application.

The man who finds himself adapted to the undertaking may safely invest his money, and be assured of obtaining, to say the least, better returns than very many other occupations offer at the present day.

And now a word as to other subjects—other kindred occupations that the bee-keeper may follow to advantage. I hold out no hopes that bee-keeping alone will support a family, at least in this country. Many young people who fail at office work, or in other occupations, turn to poultry, to bees ; or it may be fruit or other farming ; and in the following pages I endeavour to show how a minimum profit of £300 per annum may be secured from 30 acres of grass land by making the most of everything that can be worked upon it, so that one branch of agriculture may help another, while on the other hand, if the season is unfavourable for one item, it is often even more suitable for some other of the several occupations carried out upon the farm of moderate dimensions.





INTRODUCTION.

THE Culture of Bees is one of the most healthful occupations that can be named, and at the present day it is being adopted as a business, while the number of people in all ranks of life who keep only a few hives as a pleasant pastime is very large, as may be judged from the fact that the members of the various associations in this country make up a total of many thousands. Consequently, more honey being on offer, this matchless gift of Nature has become much cheaper than it was a few years since, when the supply was very limited.

While an increased production has lowered the value, there is at the same time a larger and increasing demand for the bee-keeper's commodity; and as he now has the benefit of improved appliances there is no difficulty in competing with present rates. In fact, it appears likely that very soon it will not pay foreign countries to send their honey here, as continued improvements are reducing the cost of production at home.

When honey was superseded by sugar, bee-keeping seems to have fallen into the background, but after a time light began to dawn, and some forty years since, by using hives wherein all the combs could be removed separately at will, a great stimulus was given to both practical and

scientific bee-keeping ; consequently, the ranks began to swell, as it became known that much larger harvests could be secured than by the old fixed-comb methods, and in every way the bees could be brought more under control.

But more light was yet needed, and Bee Journals were established, but it was not until the year 1873 that this country could boast of one, and that was founded by Mr. C. N. Abbott, of Southall, as a monthly, and who ably conducted it for about ten years, when it passed into the hands of the Rev. H. R. Peel. In May, 1883, the *British Bee Journal* was issued fortnightly ; in August, 1885, Mr. T. W. Cowan became editor and proprietor, finally issuing it as a weekly in July, 1889. Soon after the above journal was established we find Mr. Abbott inaugurating the British Bee-keepers' Association, his object being the diffusion of the knowledge of bee-keeping, especially among the poorer classes, as a means of bettering their condition.

In 1874 this body held its first great Exhibition of Bees, Hives, and Honey at the Crystal Palace ; and since that time other Associations have sprung up, one after the other, each holding its own Annual Show. Is it any wonder then that thousands more have become acquainted with the value of the busy bees' product.

The manufacture of hives and appliances has become quite an industry, giving employment to many ; but it is generally carried on in connection with the making of foundation, as well as with some other, or all of the several, branches of apiary work.

Honey in the comb will ever remain a luxury, but that in the liquid form is destined ere long to be found in almost every family, besides being used in various manufactures ; and the apiarist should do his best to place the latter upon the market in as cheap a form as possible, at

the same time being careful that such shall have a neat and attractive appearance.

Among the early pioneers of movable comb-hives, may be mentioned Mr. Woodbury in England ; the Rev. L. L. Langstroth, in America, and Dr. Zierzon, in Germany ; and though the latter cannot be said to have used movable frames, he nevertheless adopted movable top bars, which of course could only be withdrawn after the comb attachments were separated from the walls of the hive.

INTRODUCTION TO REVISED EDITION.

The flattering reception accorded to the earlier editions of this work, and the desire for a new issue, has encouraged me in now offering a further edition, after making a careful revision ; while it will be found that a large addition of new and valuable information has been made.

It should be understood that small (less than 1lb.) packages for honey find little favor in general commerce. In every direction we see that prices are ruling lower than they were some few years since ; and the consequence is that larger receptacles are required, so that jams and similar articles may be supplied to the public at a minimum of cost.

While there is now an unlimited demand for honey, the prices obtainable will vary, according to the energy displayed by the individual bee-keeper. If he is his own salesman and will use some of the methods given herein for creating a demand, or some novel plan of his own, his returns will be considerably in excess of those secured by the less active producer.

For rapid and convenient handling, the retail trade requires some protection for comb honey, but the producer must endeavour to give the best possible effect at the least expense, as he will certainly not be repaid for any great outlay in that direction.

A feature of serious importance to honey producers is the re-introduction of the larger brood frame, much used before the present Association frame came into use ; the latter having repeatedly proved too small for the purpose, when its results have been compared with the advantages derived from the other.

My non-swarming system has been greatly improved, as by a new arrangement of sections, the worked out-comb may now be secured in them in the most perfect manner, while neither the foundation nor the combs are cut up to fit into the separate sections ; a great saving over any of the former plans of procedure.

The working of new section combs expressly for the current season's work, as first set out in my pamphlet of 1886, is herein explained, and illustrated according to latest developments.

The Chapter relating to bees and fruit, seeding crops, etc., has again been considerably extended, showing how largely the growers of such crops must depend upon fertilisation by the honey-bee in particular, for the success of their plans. It is an item which should be largely circu-

lated in the interests of both apiarist and agriculturist; it will certainly result in a better understanding between those engaged in the respective pursuits.

The Chapter on honey and its uses, has had some important additions made to it, in showing the practical uses of honey in both chest and throat complaints; in what form to use it, as well as giving such recommendations for other rational treatment in connection therewith, which will seldom fail in affording speedy relief. This knowledge should be spread broadcast by every bee-keeper who has honey to sell.

The subjects of queen-introduction, queen-rearing, and many others will be found to have undergone careful revision; while in some cases other valuable facts have been added, as the result of a further extended experience.

A revolution has occurred in the treatment of Foul Brood; or rather I should perhaps say that a complete change has taken place in my own methods of dealing with that disease since the last issue of this work. The new treatment is of such vast importance to bee-keepers generally, that I have been requested by my Readers to include in my new work the several propositions formerly published by me in another paper, in connection with the origin, development, and cure of Foul Brood, both with and without medicine, and without the destruction of valuable combs and other material.

Radical change or revolutionary teaching, though proving correct in application, is seldom accepted as an economic principle for at least a decade after its advent. The same may be said of my original principle of advanced hive construction, and prevention of swarming, as finally represented in the Conqueror hive which was illustrated in my 1893 edition and left to work its way upon its own merits.

By referring to the bee-literature of that period, it will be found that neither at home nor abroad was there any mention of a non-swarming hive or system until after the publication of the Author's pamphlet upon the subject in 1886; many copies of which were circulated both here and in America, as well as in the colonies, and other countries.

In the same work was given also my Systems of Controlling Swarming with common hives, such as "Swarming without Increase," and "Combined Swarming and Doubling without Increase"; definite and vital principles laid down in the said pamphlet of 1886, and such as are not even yet realized by the majority of bee-men who are still striving after what has already been given them to see and to use—processes which will enable them to double the strength of their honey colonies.

I may be excused for suggesting that this work will not become out-of-date, when I refer my Readers to the American Bee-Journals, wherein quite recently a number of methods offered by our cousins as new and valuable items in management, were first published by myself in definite form ten to twenty years ago.

Thus in addition to the above methods of controlling swarming by artificial swarming, we have "The Bleaching of Comb Honey"; "The Systematic Production of New Combs in sections prior to the current honey season"; "Building queen cells upon separate and movable pegs"; "Confining queen cells and virgin queens in tubular cages"; "Several queens in each nucleus"; besides other matters treated in my earlier works and herein enlarged upon.

S. SIMMINS.

BROOMHAM,

HEATHFIELD, SUSSEX.

MAY, 1904.



CHAPTER I.

BEE-CULTURE AS A PROFESSION, AND FOR RECREATION.

THE production of Honey on a commercial basis being now an established industry, there are many inducements offered to those who wish to take up a light and pleasant occupation, as a secondary aid in augmenting a perhaps too restricted income ; or as an adjunct to farming, or even as the principal item upon the farm. As will presently be shewn, almost the entire farming operations may be made subservient to the need of the bees, so that the agriculturist's profits may be almost doubled.

In the case of fruit farming, too, the benefits to be acquired by the culture of bees on the spot, cannot be over-estimated, for the better the fertilization of the bloom, the more productive will the fruit trees become.

A natural ability, and a rational enthusiasm are necessary for the making of a successful bee-keeper ; and therefore, unless a man makes himself thoroughly acquainted with the peculiarities of bees, he is doomed to disappointment should he attempt to give his time and capital to this occupation.

There are two courses open to those who wish to follow the art of bee-keeping, whereby to gain a living, or for the purpose of adding to their present income. First, by having a few hives, and gradually increasing the number

over a term of years, until the experience gained justifies one in making extensive additions to his working stock ; though, unless under such very favourable circumstances as are sometimes found to exist, it will be unwise to discard any present occupation. By far the better plan will be to

Work in some Established Apiary

for a couple of years, if possible. By so doing, you save time and money ; your plans must be more definitely formed, and the solid experience thus gained will be far more certain to put you on the right road to successful management than half-a-dozen years spent in working up a small apiary. You start at once with all modern material ; and, buying in large quantities, a considerable reduction will be gained ; whereas, many of the appliances collected from time to time, under the former condition of preparation, have become valueless by the time the apiarist enters more largely into the business, leaving out of the question that much of his material may consist of odd patterns, and cannot be used to the best advantage.

The man who has served his time in a large apiary will next have to consider how he is

To obtain the necessary Materials.

In the first place, there is more risk in buying his bees than he is likely to incur at any future period of his experience. Many buy bees of irresponsible advertisers, and though the latter may consider there is nothing wrong with them, the purchase often turns out simply worthless.

If it can be so arranged, the student should by all means buy his stock from the apiary where he served his apprenticeship. He ought to know something about the condition of the same, and may rely upon the proprietor

treating him honorably. Failing this, the owner will probably know where and how he can secure stock that can be relied upon.

Under ordinary conditions there is a certain risk about bee-keeping ; but the reader, by referring to the chapters relating to Planting and Breeding, will at once see how the whole thing can be rendered a certainty by those capable of following out the instructions to be found therein.

The Choice of Location.

is another matter requiring serious consideration. It would appear unnecessary to advise a bee-keeper not to establish an extensive stock in a district where an advanced apiarist already has many hives ; but he should not settle his bees in large numbers close to a town, or near a public highway. Select some quiet spot, in a valley if possible, and the further from any manufactory the better, but do not lose free communication with some large centre, or railway convenience.

When you know that you will presently be entering into the business, have a good look around, and endeavour to secure a few acres in a district favourable to the undertaking ; a locality abounding in clovers, with the White or Dutch, in particular, as that most to be desired, and ensuring the highest average returns. Unless other conditions are exceedingly favourable, the absence of White Clover will result in indifferent returns, if not actual failure. This clover is sometimes grown as a crop, but more frequently the bee-keeper relies upon what is to be found in nearly all pastures, as well as by the road-sides, where the grit is very suitable to its growth. There is the Yellow Trefoil in May, also the *Trifolium Incarnatum*, (Red Italian Clover) ; in July Alsike clover,

and after the White has bloomed from the early part of June, as a crop, until near the middle of July in the pastures, there are the Limes in some places, yielding much nectar. The Sycamore, too, generally gives a quantity of honey ; then there are market gardens growing the various small fruits ; also large orchards, the honey from which, though not often large in quantity, is of considerable value to the bees while supplying the wants of a rapidly increasing population. It is seldom all the foregoing are to be found in the neighbourhood of Heather, though in Autumn it will pay well to move bees to the same if within a reasonable distance, as the honey generally commands a good price.

On chalk soil, particularly among the South Downs, we find the Sanfoin early in June and about the middle of August ; Wild Thyme in July, and numerous wild flowers of the thistle family during the Autumn ; as well as a species of Trefoil (*Lotus Corniculatus*) during the Summer. Red Clover is also grown in great quantity, upon the second crops of which the foreign races only can work ; and as the first cutting of this plant would otherwise be very light, Yellow Trefoil is mixed with it, and this flowers freely for nearly a month before the first mowing. The blackberry must not be forgotten, in some parts being so abundant as to give quite a surplus of good colored honey. Privet hedges, after further experience, I am inclined to regard with suspicion, as yielding poisonous honey.

Should the bee-keeper's lot fall upon any spot not favorably situated, and expecting to work many stocks, he can only do so by making such arrangements as will allow him to

Grow suitable Crops

which will also do for hay, and even in a good district he

would do well to have some large crops going throughout the whole season. I have sometimes been asked

What Amount of Capital should be Invested

to ensure a certain income ; but, considering I know nothing of the capabilities of those who apply by letter, it would be useless to attempt a satisfactory answer, and in many cases unwise to give any encouragement at all, where the fullest particulars as to locality and personal qualifications are not given. Everything relating to his surrounding honey-producing plants and trees should be well known to the advanced apiarist, who will not be certain of success on a large scale just because a few particular colonies have yielded comparatively large weights. He will first find it his duty to pay the greatest attention to securing the *highest possible average* return from his stock, both by carefully breeding by a process of selection, and systematic union of forces, that immense populations may be on hand at the right time. He who has thus far mastered the science, will have no need to ask the foregoing question, but the list of estimated expenses may in some cases aid enquirers to obtain much needed information.

It should be almost unnecessary to point out that "everything must be done at the right time ;" there must be "a place for everything, and everything should be in its place." Thus by constant and careful attention, and by keeping all things in order, the specialist will command success ; but the man who is not naturally of an orderly and temperate disposition, and moreover is not enthusiastic, and a lover of Nature (the natural qualifications of a bee-keeper), had better keep out of the business, or failure will surely be the result. At the same time, it is by no means certain that reverses will not occasionally be met

with by the most expert and painstaking man ; but such difficulties should be looked upon as inducing a greater stimulus, with renewed effort and more determination to overcome every obstacle.

The Estimated Expenses for the First Two Years

will be found as under, the apiarist, having had two years' apprenticeship, starting with not less than 100 colonies, and with some £500 as his capital ; otherwise he will struggle on for years before his business can be satisfactorily established.

FIRST YEAR : GENERAL EXPENSES.

			£	s.	d.
100 stocks in "Standard" hives	...	... at 30/-	150	0	0
100 extra body boxes, with frames	...	... at 3/6	17	10	0
200 dry-feeding dummies	...	... at 1/-	10	0	0
50 rapid frame feeders	...	... at 3/-	7	10	0
One 2-cwt. cylinder for reducing sugar to syrup	...		1	0	0
Large glue pot, for melting wax to fix guides	...		0	1	6
Flat-blade scraper	...		0	1	6
Wax extractor	...		0	17	6
Timber for work-shop and honey-room	...		20	0	0
Labor	...		10	0	0
Timber for frame rack, store rack and sundries, labor, &c.	...		10	0	0
Rail carriage, cartage, &c.	...		10	0	0
Carpenter's bench and tools, nails, screws, paint, &c.	...		11	10	0
Rent (more or less)	...		15	0	0
Sugar	...		5	0	0
Total			£268	10	6

Add the following if Comb Honey is to be worked for. .

			£	s.	d.	£	s.	d.
300 sets of super crates	...	... at 2/6	37	10	0			
6,000 1-lb. sections...	...	... at 20/-	6	0	0			
100 1½-do. crates, glass two sides	...	... at 2/6	12	10	0			
100 lbs. super foundation	...	... at 2/-	10	0	0			
General expenses...	...		268	10	6			
Total, first year			...	£334	10	6		

Add the following if Extracted Honey is desired :

			£	s.	d.	£	s.	d.
	300 extracting supers,	... at 2/6	37	10	0			
	Uncapping stand, knives, &c.	...	2	2	0			
	Honey extractor	...	1	15	0			
	6 honey cylinders, 500lbs. each	... at 15/-	4	10	0			
	50 three-dozen crates	... at 3/-	7	10	0			
	25 one-dozen crates	... at 2/-	2	10	0			
lbs.	100lbs. brood foundation	... at 2/-	10	0	0			
1728	12 gross 1-lb. glass jars	... at 14/-	8	8	0			
	12 " corks,	... at 1/6	0	18	0			
1728	6 " 2-lb. tins	... at 18/-	5	8	0			
1296	3 " 3 " "	... at 24 -	3	12	0			
864	1 " 6 " "	... at 30 -	1	10	0			
—	General expenses	...	268	10	6			
5616								
	Total, first year	...	...	£354	3	6		

GENERAL EXPENSES, SECOND YEAR :

Rent (more or less)	...	...	15	0	0
Sugar	...	...	10	0	0
Sundry expenses, carriage, &c.	...	...	5	0	0
					£30 0 0

Working for Comb Honey :

Total first year	...	...	334	10	6
100 extra super crates	...	... at 2/6	12	10	0
6,000 1-lb. sections...	...	... at 20/-	6	0	0
50 1½-doz. crates	...	... at 2/6	6	5	0
100 lbs. super foundation	...	... at 2/-	10	10	0
General expenses	...	...	30	0	0
	Total, second year	...	...	£339	15 6

Working for Extracted Honey :

Total first year	..	...	354	3	6
50 3-doz. bottle crates	...	... at 3/-	7	10	0
lbs. 100 extracting supers	...	... at 2/6	12	10	0
2880 20 gross 1-lb. jars	...	... at 14/-	14	0	0
20 " corks	...	... at 1/6	1	10	0

				£	s.	d.	£	s.	d.
1728	6 gross 2-lb. tins	...	... at 18/-	5	8	0			
1296	3 " 3 "	...	... at 24/-	3	12	0			
864	1 " 6 "	...	... at 30/-	1	10	0			
—	General expenses	...	...	30	0	0			
6761									
Total, second year ...				...	£430	3	6		

ESTIMATED RETURNS, AT A LOW AVERAGE, TAKING A SERIES OF YEARS.

Comb Honey: First Year.

100 stocks, at 50lb. per hive—

5,000 lbs. ... at 8d. 166 13 4

Total for the year ... £166 13 4

Second Year:

Increased to 125 stocks, at 50lb. per hive—6250

lbs. ... at 8d. 208 6 8

Increase to 150; sell 25 ... at 30/- 37 10 0

Total for the year ... £245 16 8

Extracted Honey: First Year.

100 stocks, at 75lb. per hive—

7500 lbs. ... at 6d. 187 10 0

Wax ... 2 0 0

Total for the year ... £189 10 0

Second Year.

Increased to 125 stocks, at 75lb. per hive—

9375 lbs. ... at 6d. 234 7 6

Wax ... 2 10 0

Increase to 150; sell 25 ... at 30/- 37 10 0

Total for the year ... £274 7 6

The greater part of the expenses go towards stock-in-trade; but after the second year, the outlay will be smaller, while the returns will be considerably higher, as the

apiarist consolidates his working force. The quantity of sugar required may amount to more or less according to the season, and the extent to which the bees are deprived of honey. The better management is that whereby the largest surplus is obtained *without depriving the stock-chamber* of honey at all; in which case the labour and expense involved in feeding will often be unnecessary. Having charged the cost of bottles and tins, the same is added to the selling price of the extracted honey, as showing the more correct estimate.

Number of Colonies.

In reference to the foregoing estimates, it will be seen that it is proposed to keep the number of colonies but little over one hundred, increasing the first year to 125; the second season to 150. It is then understood that 25 stocks are to be sold; when the remaining 25 over and above the 100 will provide against all accidents, such as weak colonies, loss of queens, etc. during the winter; thus ensuring that the number shall not fall below 100. This is as far as any one person should attempt to extend until he is very certain he can manage more. With that number no assistance is required, but when greater extensions are decided upon, the apiarist should get some intelligent lad, and take care in teaching him to become an expert assistant. It is surprising how quickly a youngster takes to the various manipulations, and in this line he will, more often than not, be of more service than a man at much higher wages.

Where the apiarist is capable of making up most of his own appliances, his time will be mostly occupied during the winter, and then timber will stand in the place of many of the articles enumerated, making a considerable reduction in cost. The owner's labor in the apiary has, of course, not

been estimated, as that can only be valued by the balance of profit shown at the end of the season; the laborer is worthy of his hire (profit).

The Average yields per Hive

for both comb and extracted honey, taking a series of years, have been placed on a fair basis, but in a fairly good district the beekeeper should have no trouble in exceeding those figures, if there are not more than a total of 150 colonies standing in his area, or range of bee-flight. In a very favourable locality, or where the owner plants bee-forage, the average will be still higher, and more stocks may be placed in one apiary without any apparent diminution in the "out-put" per hive.

The editor of the *British Bee Journal* states that he obtained 1360 lbs. from seven hives. This was extracted honey, but his results in comb have often exceeded 100 lbs. per hive. These weights were obtained from a limited number of stocks; it will be seldom, however, that such returns will be gained where a larger number are to be managed. I have had 50 lbs. stored by a single colony in seven days: and in 1886 had a queen sent me, whose bees, without attempting to swarm, had given upwards of 250 lbs. of honey, about 200 lbs. of which were in nicely-finished sections. Such results show what is possible if the apiarist will always breed from the best strains, as set forth in the chapter upon that subject.

What Kind of Honey to Produce.

It has often been stated that it pays best to run an apiary for extracted honey, but my own opinion is that to obtain the most desirable crop, the apiarist should work for both that and comb honey. Certainly a larger

quantity of extracted honey can be obtained, but this will stand in the proportion of 50 to 30 lbs. of comb. Most practical men will admit this is correct, and upon this basis I have made out the estimates. It will be noticed that there is little difference between the first cost on stock-in-trade, whether comb or extracted honey is worked for, but the season's produce of extracted honey costs for receptacles more than three times that of the other. After the combs are once established for extracting, with no further outlay in foundation, and a large quantity of new wax from the cappings, the balance may be in favour of this class of honey ; but against this we have to place more labour, and that not of the cleanest. I have published these estimates that the beekeeper may have a ready means of making his own comparisons, and be more certain of what he is about ; and I do not, by any means, intend the estimated returns to be taken as implying a certainty.

Dear reader, throughout these pages will be found my utmost desire to save you from the mistakes made in the past by myself and many others. Experience is of course the best teacher, and its lessons nearly always leave on record instances of failure, of a more or less serious nature, which has to be met before final success can be ensured. Experience thus gained is of value to others starting out upon the same course, just in proportion to their willingness to be guided by the advice given. Right here I must insist upon

One Point of the Greatest Importance.

When you have decided to make a start upon a large scale, purchase your bees, in one lot if possible, during the month of April or May, and have them removed to your own place at once. I do not contemplate that the

transaction will take place at any other time, and can certainly give no advice for obtaining them at another date, where the highest possible returns are desired from the first season's work. If you begin earlier or later, earlier in particular, the first great mistake is made, and very likely one which will be the cause of ultimate failure.

I have known apiaries purchased during mid-winter, and sent many miles by rail, to be simply wiped out before the summer arrived ; the seller thereafter being sued for damages, and made to refund a large proportion of the value, because the purchaser could shew that some of the stocks were slightly diseased, and considered that was the trouble ; whereas the fault was mostly his own for making the purchase and moving them at that unseasonable time, and thus making it impossible for the bees to regain their normal hibernating condition.

Other stocks moved in February or March, have dwindled terribly after a long railway journey, simply because the bees that had wintered were unfit to bear confinement, and thereafter, through the too-early excitement soon wore themselves out, without first being able to renew the population of the hives.

Bees moved in April or May

undergo just that condition of excitement which induces healthy activity at exactly the right time ; the queens become equally energetic under the consequent stimulation ; and better progress is made than if they had not been disturbed. If moved in February or March the same excitement causes the loss of thousands of the older bees, through flying for what they cannot obtain at that early date ; the large patches of brood lose the warmth hitherto afforded by such workers, and the hive deteriorates to such an extent that the whole season is unprofitable.

By purchasing as I advise there are plenty of young bees to fall back upon ; you get only good stocks which have stood the ordeal of winter ; there is no further risk, and the whole season is before you. These statements are based upon hard facts and experience, and the reader will do well to be guided thereby.

So far we have considered one branch of bee-keeping only, but another thing is the

Sale of Bees and Queens.

This is most profitable, more certain, and the returns quicker than when producing honey ; but, at the same time, special qualifications are necessary to enable a man to conduct a queen-rearing business successfully, and unless he finds himself peculiarly adapted to the undertaking, he had better confine himself to honey, as continued application, constant care and thought, are required in a much higher degree, to enable one to carry on this interesting work. It should also be understood that where bees and queens are raised for sale, the apiarist will have to be satisfied with but a limited quantity of honey ; in fact, if his demand is large, in some seasons instead of a surplus, a considerable amount of sugar will be required for winter store, while his stock is seriously handicapped during prolonged spells of bad weather, when many virgin queens are on hand. It will take some years to gain a connection, and in the meantime your advertisements must be frequent, but limited in extent and cost.

Do not attempt much in the way of selling bees and queens until you have a substantial stock of at least one hundred hives to draw upon, or you will never obtain much benefit from them if you are depending largely upon this source of income.

Still another department is connected with apiculture :

The Manufacture of Appliances

is carried on by a number of reliable men, each of whom has an apiary ; some of them add the making of comb-foundation, while nearly all find it necessary to continue some other business. On the other hand there are many, who gaining a first insight into bee-keeping, think it a great chance to make money by advertising hives for sale, either of patterns already in hand, or some idea of their own. This branch of the business is now so much over-crowded, and well-made goods can be obtained so cheaply, that there is no demand for badly constructed hives such as the amateur often turns out. His advertising expenses are never returned, and he soon gives up in disgust. I do not mean to imply that no good is ever to be done in a small way ; but it is better for the beginner who can turn out a decent article to confine himself to local requirements, while continuing his usual occupation. As a rule the buyer will find it to his advantage to go to a well-known maker, and get what he wants at a cheaper rate, and correctly made.

It is so far doubtful whether honey-producing alone will ever become a reliable source of income except under particularly favourable conditions, or where conducted in connection with growing crops on the farm, but with the manufacture of appliances and foundation, the sale of bees, etc., it is possible to secure good returns where capital is judiciously invested, and labour is economised. There are several rural occupations that can be carried on in connection with bee-keeping to advantage. Fruit-growing is generally profitable to those who understand its culture. Poultry, on a small scale, can be made most profitable, and a large

portion of the proceeds, in eggs and fowls, may find their way to the owner's table, in addition to those sold. Other pursuits may occur to the individual bee-keeper, such as may not seriously interfere with the main occupation, though his surroundings, and space at command, will largely influence his plans.

Bee-Keeping for Recreation.

While the greater number of amateurs endeavour to get all the profit they can out of their bees, there are many who keep them because of the pleasure afforded by studying their habits ; though, of course, the delight experienced in being able to place pure honey, in its most chaste form, upon one's own table, and that of friends, is by no means a secondary consideration. Nothing can be more appreciated than a present of beautifully white honeycomb in sections or bell-glasses ; and what, moreover, can exceed the pride and pleasure of thus being able to present that which is your own production ; a thing of beauty, which has been gradually "growing" under your fostering care.

The busy man who occasionally spends a few minutes with his bees, finds healthful and soothing recreation for both body and mind ; and fortunate are those whose leisure gives them almost unlimited time to carry out the study of these remarkable insects. It can truly be said that they are a never-failing source of interest, there being always something new to discover, either as to their habits or management.

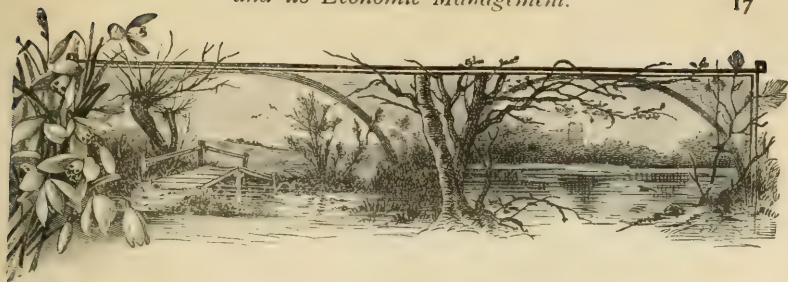
Modern bee-keepers are enthusiasts, and among all who study the subject there is a general understanding and mutual sympathy. The novice may therefore go to his nearest neighbour who may be following the pursuit, and be certain of a hearty welcome, and a free gift of all the knowledge about bees that he may have gathered by many

years of practice ; but nevertheless, just here, I advise the beginner not to go to his more expert neighbour every time a difficulty occurs. He must bear in mind his past lessons, and strive to help himself.

It does not much matter at what time of the year you may begin in a small way ; you have first to gain confidence in handling bees before you can make much out of them. Get some friend or other apiarist of experience, if possible, to overhaul the stock you wish to purchase, and be guided by him as to its value. In the absence of friendly advice, you cannot do better than buy a first swarm from some cottage bee-keeper. Obtain your hives from a well-known maker, and so get them correct in measurement ; otherwise your expected pleasure will be somewhat marred, and your manipulations sadly complicated.

While the number who may be capable of making bee-keeping their main occupation, will be limited, almost every one can keep a few colonies at great advantage to health, and at the same time make them pay their own way. Even the scientist need not go to any great expense over his investigations, as with ordinary care his bees can be made to return all the money he may require to lay out for such purposes.

The cry of "over-production" is but a false alarm, and we need not fear, however many become honey-producers in our generation. No genuine article of food will long want for a customer, if only it is presented in an attractive manner at a reasonable rate. There are many ways in which honey can be utilised, not only as food and medicine, but also for a number of manufacturing purposes ; and while the fact that many others will continue to enter into the occupation, may cause reduced prices, the value of honey will become more generally known, to the advantage to all concerned.



CHAPTER II.

HOW TO HANDLE BEES.

AMONG the uninitiated the general impression is that bees are certain to sting if molested, but if let alone they will not touch one. This is to a certain extent true, and while a novice would generally be unable to open a hive to take out the combs and bees, without being attacked, the expert may do almost anything with neither veil nor gloves, and seldom receive a sting. Of course, the difference is that the former has not yet gained that caution and confidence necessary in all his manipulations, and this will come only by practice ; no one can give him the desired skill to start with. A calm and deliberate motion should be acquired by all who hope to handle bees successfully. I have known those who were looked upon as experts to have a very unpleasant manner while manipulating bees, making it unsafe for any unprotected companion, and disturbing a whole apiary for days. Though such operator may not himself mind stings, this carelessness should be overcome if the owners visited are to have any pleasure in their apiaries.

Precaution against Robbing.

Where an expert is called upon to put an apiary in order, or remove the crop of honey, difficulties are likely to occur before he can get through a large number at one

place, if precautions are not taken. As far as possible, while on a tour the larger apiary should be visited last, and the work so timed that it will be completed towards dusk, and no combs from the extractor should be returned till then. These remarks apply to Autumn in particular, though there are other periods when honey is not coming in, and not only then, but at all times the owner should be very careful not to give his bees a chance even to *start* robbing, with its consequent fighting, loss, and annoyance.

Preventive measures are of course the first consideration, and in the case of fairly large apiaries some bee-proof shelter is a great necessity, as many operations may there be carried on which would be impossible in the open. Many of the stocks may be carried into such shelter for examination or deprivation; and besides being invaluable for extracting, will be found most useful for queen-rearing and many other purposes.

If through negligence in carelessly allowing honey or syrup to be exposed in the apiary, the

Robbing Mania

has once commenced, as may also be induced by the injudicious opening of hives, or badly fitting floors, etc., then the uninitiated will find he has let loose a power which will require his coolest judgment to enable him to subdue. I have known horses, chickens, dogs, and other animals severely attacked by bees because the skep of a neighbour having been placed upon an old block cracked in every direction, offered capital openings for a host of determined robbers, whom I found coming and going like some irresistible hurricane. All openings, except one reduced to a $\frac{3}{4}$ -inch tubular passage-way, were immediately stopped; the watering can was freely used, and dripping sacks left over the skep. In a few minutes

all was quiet. Where the ire of bees has been aroused by the careless removal of honey in Autumn similar difficulties are likely to occur, but in this case they will remain irritable for days or weeks, unless fed with a little syrup in the evening.

Robbing in the same apiary is sometimes cured by making the attacked hive exchange places with that of the assailants; carbolic acid in solution, on cloths placed about the front of the unfortunate hive, will put an end to the disturbance; and where all the stocks in an apiary can be fed up simultaneously in the Autumn, there will be no further inclination to rob, and all the necessary work may be completed in comfort.

Having shown that the first care of the apiarist is to be cautious, that his bees may always be held well in hand, it will now be desirable to consider under what conditions they may be handled without fear of being stung. We will first note that as a rule,

Clustering Swarms do not Sting.

Nearly everyone has noticed how readily a new swarm may be handled; the bees having no inclination to sting. The reason is not so much that they are full of honey, as is usual in swarming time, but that they are homeless, and have only recently been under great excitement. By the aid of some intimidant, the bees of an established colony may also be excited and made to fill themselves with honey, when the combs can be removed at will. It does not happen, however, that all the bees rush to the cells; I have frequently noticed that many do not attempt to do so, but these may be already loaded, though the state of excitement is so soon communicated to all that none, as a rule, attempt to retaliate when the hive is examined.

When necessary to look into a fixed-comb hive (commonly called a "skep") first drive a few puffs of smoke in at the entrance from a bellows smoker, as illustrated, which is of the "Bingham" pattern. Give the sides of the hive several sharp raps, then turn it up in a line parallel with the combs, so that none may fall on one side, when, after a little more smoke driven across the now exposed combs, any necessary examination may be made; though of course the investigation can be little more than a superficial one. The smoker is so arranged that when placed in a vertical position there is a continuous draught, but if put down the other way the draught is at once stopped, and the fire goes out. While it is desirable that no more be used than is really necessary, the operator should on no account proceed until he has used sufficient smoke or other intimidant, that he may be quite certain he has the bees well in hand. Many overlook just this necessary precaution, causing needless loss of bee-life, as well as inconvenience to others, if not to themselves. After any operation these little insects should, if carefully treated, be no more disposed to sting than before. Of course exceptions to this rule will be met with, and while at some more favourable seasons, and with some quieter races of bees, little or no smoke may be needed, there are other stocks nothing seems to thoroughly subdue; and though these are often the best honey-gatherers, the novice will soon want to be rid of them; this is best done by deposing the queen, and giving one from a quieter strain. When it is desired

To Drive and Transfer

bees from a straw skep, or other fixed combs, to movable frames, then after smoking and inverting the old hive, let its crown rest upon the ground; place an empty skep or

box above, fitting exactly mouth to mouth, and then continue to rap upon the sides of the lower hive with the hands or a stout stick ; but on no account jar in such a rough manner that the combs become broken from their attachments, or many of the inmates will be smothered in the honey. Soon the bees will be heard roaring on their march upwards, being in fear of the trembling combs falling about them. In the first instance a cloth may be secured around the junction of the two hives, thus ensuring that no bees rush out ; after a few minutes this should be removed, and the upper skep tilted from front to back, having first been secured to the other by a skewer, or anything that will keep the rims together without shifting. The operator will soon prefer to do without the cloth and keep the skeps parted from the first, when the queen may be captured as she ascends, if desired. It should be so arranged that the back where the bees are to run up shall be the highest point, and that at the ends of the lines of combs, or the bees will not go up readily. Then transfer the combs to the frame hive, and return the bees, as explained in Chapter XI. One is often told to procure a pail or table whereon to place the skeps while driving, but the operator will find the earth a far better "stand " than any other.

Bumping.

After first intimidating the bees, another way to get them out, is to invert the hive and give it one or two sharp "bumps" on the ground, at the edge of the crown on the side parallel to the combs. If carefully done the combs break away from the sides and top of the hive much cleaner than they can be taken out by any other way. Brush the bees off into an empty skep with a feather, and transfer the combs as desired. This plan was first

introduced by Mr. F. Lyon, and has met with great success.

Throwing.

This is quite an old plan, and where the combs are fixed, either by cross sticks through them in skeps, or in shallow-framed hives, nothing can exceed its simplicity and rapidity. Place an empty hive on a sheet upon the ground, mouth upwards; stand over the same with the stocked hive held by the hands at the rim between the legs of the operator; raise the hive and lower it quickly, then stop the motion with a sudden jerk just as the empty hive is neared; repeat as often as necessary and the bees will be all thrown out. Wait a few minutes after smoking them, lift the hive and proceed, when the bees having discontinued feeding at the cells, will come out more readily. This rough and ready process was carried out only with the cross sticks through the hives and combs so that the latter could not fall; and Mr. Heddon has more recently adopted the same thing with his shallow-fixed frames. In the case of frame hives the bees will be shaken down on the top, or at the entrance, of the lower hive, by handling one frame at a time.

Manipulating Bees in Frame Hives.

The foregoing operations are seldom necessary with movable-comb hives, as each frame may be removed at will, and this meets all requirements. When any operation has to be carried out, first lift the material covering the frames, and drive a few puffs of smoke among the bees, replace the "quilt," and after a few seconds peel the same off with care, and make the necessary examinations. Remove and replace each comb carefully, taking care not to crush any bees while so doing, and see that your smoker is on hand in good order, in case they may get trouble-

some. If the combs are to be cleared, shake the bees back into the hive, or at the entrance by a motion similar to that of throwing, beginning however with a gentle shake, and then more vigorously, as the bees become frightened. Nothing tends to subdue them so thoroughly, and on no account should a brush or feather be used until the bees have first been so shaken; as by brushing them from the combs they are much irritated.

Italian and Carniolan Bees seldom require to be intimidated. They can be handled almost anyhow, and what is remarkable with both these varieties, and also some stocks of Syrian bees, it matters not how long the hive may remain uncovered, they continue perfectly peaceful. With these, begin by peeling off the quilt gently, and then proceed to remove the combs in the same manner, and hardly a bee will take wing. Get them from the combs by shaking as above, when necessary, and no stings will be given as a rule.

Uniting.

Where bees are in fixed combs, drive both (or all), then remove all queens but the one wanted; stand the combed hive to receive them in an inverted position near to where they are to remain and throw all into the one. As soon as the bees are a little settled turn the skep right way up on two 1-inch sticks laid on the floor board; remove such sticks in the evening and see that the entrance is not less than 3-in. by $\frac{3}{8}$ -in.

Bees in frame hives can be joined by alternating the combs of one with those of the other. Smoke each hive and then part the combs so that no bees hang from one to the other, and then proceed to unite the two. Leave only one queen, cover up carefully and do not disturb them again. If two standing near together are to be

united, move the hive to be occupied half-way between the two, and take the other hive right away. A board placed against the entrance, slanting to the ground, will aid the bees in collecting at that spot, while the original inhabitants of the hive will also feel in a strange position.

Late Autumn Uniting.

In general, when preparing for winter I nearly always wait until October and November, and then a stock can be carried any distance in the same apiary and joined to another, with no loss of flying bees, and none get far from home at that date, and not flying frequently they will always make a note of their position. Many use thin syrup scented with peppermint wherewith the bees are sprayed, thinking that a common scent will make them unite peaceably, but there is no need for anything of the kind, if but one queen is allowed, and my directions are followed with regard to separating the combs and fully exposing the whole of the bees to the light for a few minutes before the union is accomplished.

Another very satisfactory way is that of removing the best of the brood combs, and adhering bees of a colony to any distant hive requiring them, while the remainder may be united to any neighbouring hive, without the possibility of losing any flying bees. The queen, if one, being utilised as may be most desirable. By

Uniting after Three Days

from the removal of one queen, the operation is usually perfectly safe and satisfactory, while if both colonies had been queenless prior to uniting, the merest novice will find no difficulties in the way of this frequently dreaded operation.

Uniting by Exchanging Combs

a day or two beforehand, is also another novel item I have frequently offered to my correspondents. This is particularly useful where a nucleus having been confined in transit by rail or otherwise, is to be united to a weak stock on arrival. If the nucleus is placed near the stock and given a flight, it may next have one or two of its combs (without bees) exchanged for the same number from the stock, and the union completed during the third evening thereafter.

Sprinkling with flour when uniting has been brought to notice through the columns of the Bee Journals; and there are many who will gain confidence by using it, though probably in the hands of a novice, careless handling will even then bring about a disaster occasionally. During the season I am daily uniting bees under all conditions without any extraneous aid, and always without fighting; therefore to me the various recommendations are simply amusing.

In the case of Cyprians and Syrians some caution is needed, but I have found that if both lots are *first made queenless* these bees can be united without the least inclination to fight while in that condition; the queen to be retained being returned in the evening. Except it be in the middle of the day during a good flow of honey *nothing else* will induce these bees to amalgamate with strangers.

Agents used in Quieting Bees.

The late Mr. F. Cheshire mentioned that methyl salicylate, using a few drops on the hands, will effectually prevent bees attacking the same.* Diluted vinegar, carbolic acid and Izal, will, I have found, answer in like

* "Bees and Bee-keeping," Vol. II.

manner. The same author also recommends a small amount of crude creosote placed upon the fuel in the smoker for subduing any colonies not amenable to milder treatment. The late Rev. George Raynor long used carbolic acid for quieting bees ; his plan being to dip a feather in a weak solution of the acid and then pass it over the frames, when the bees rapidly retreat. Fume chambers added to bellows have also been introduced, and while I have no wish to disparage those who have invented these methods of applying carbolic acid, I am compelled to say that for general purposes I have found nothing to equal the smoker, and in extreme cases the creosote or other pungent article added to the fuel.

Gloves.

While I can but regard gloves as a great hindrance to manipulation, it is necessary that the novice should commence with something of the kind, just to give him confidence. Thick woollen gloves dipped in vinegar and water, wrung out, will answer better than anything, but as soon as possible these should be discarded.

Veils.

These should be made of fine black netting to protect the face, while any white material will do for the back, and will protect the wearer from the heat of the sun. Elastic should be run round the top so that it will fit tightly about the hat ; and the length should be such as will enable the lower end to be tucked securely inside the coat collar.

Sweetened Water for Quietening Bees.

In cases where very vicious bees have to be dealt with, or when a novice thinks he may be some time finding a

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



queen, and particularly if he wish to hurry the operation of "driving," then first sprinkle the bees with a little sweetened water. After two or three minutes, all will be as harmless as flies.

Bee Stings

are, of course, dreaded by the bee-keeper when he is making his early attempts at manipulating, and occasionally he is so severely punished, even by a solitary sting, that he may begin to think seriously of giving up. In a few instances the difficulty is never overcome, but as a rule the apiarist becomes in time, not only used to, but quite careless of bee-stings. The system becomes inoculated, and whereas formerly uncomfortable and even painful swellings may have followed a sting, after a few years little is felt beyond the first sharp prick.

As for myself, I can hardly tell where the place is within five minutes after being stung, the little weapon usually being scratched off, or quickly brushed away against the clothing. The white part seen at the rear of the sting being the poison bag should never be pinched when removing it, or the remainder of the venom may be pressed into the wound.

The Sting can be Removed by the Bee,

contrary to general statements. It is not usually done, because the bee is, of course, hastily knocked off, so that not only the sting but part of its body is also torn away.

When the reader becomes so inured to stings, that when a bee darts straight at his hand, not a muscle will quiver, no matter what operation he is carrying out, then he may perhaps do as I have done—allow the bee to remove its sting in its own way. As soon as the first act is over, the second very natural act

begins, in that the bee rapidly spins round upon its sting as a pivot, while all the time drawing away from the wound. Thus only can the barb be withdrawn, and the bee having vented its anger retires, without being in any way injured. The usual

Cures for Bee Stings

are seldom effectual, for the reason that the poison instantly circulates in the blood, and the usual period of three days occurs before the swelling goes down, when a person may not yet have become inoculated.

Vinegar may allay the irritation, while sometimes a raw onion cut in half, or damp earth laid on the wound, is advised by old skep hivists. In any case cold water should be avoided, as tending still further to check the circulation.

Warm Water Applications

on the other hand (really applied as hot as can be borne), will reduce the swelling and irritation in the only natural and effective manner, both by actively relieving the congested blood, and sending it coursing through the veins; thus diffusing and thinning the poison, while at the same time the pores of the skin are fully opened and are aiding in giving prompt relief. While considering this subject, it would be well to remember that

A General Application of Hot Water

would save many a limb, many a life, and many a doctor's bill. People, as a rule, even highly-educated persons, have not sufficient confidence in themselves, and but too frequently send for the doctor, who, perhaps, knows less about their own peculiar ailment than they should do themselves.

Many a well-meaning practitioner has brought a limb

from bad to worse, by using his "stock" remedies, or by advising cold water applications, until in the end the poor limb is taken off. And yet it might have been saved, and made as good as ever, in many cases by mere rest, and no applications whatever; while in most instances the cure would have been rapid and effectual, had Nature's own remedy been applied from the first.

Moist Warmth Alone

generated life, maintains the function of life, and that alone when rationally applied effectually restores deranged members. In sprains, it relieves the painful part, by thinning the congested blood, and again setting it in motion, bringing into its place the new and life-giving fluid, which immediately sets to work in renewing the bruised tissues, and carrying off the worn and wasted cells. Congestion—inactivity—is death; movement—circulation, is life; and circulation is only secured by moist heat.



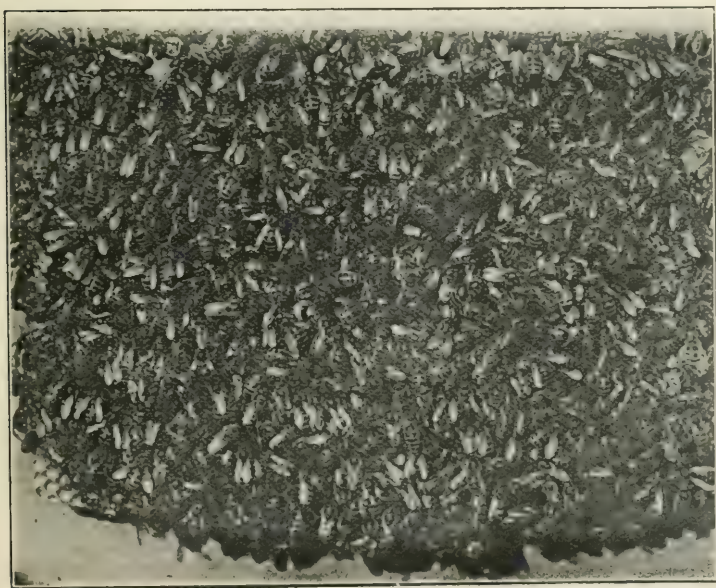
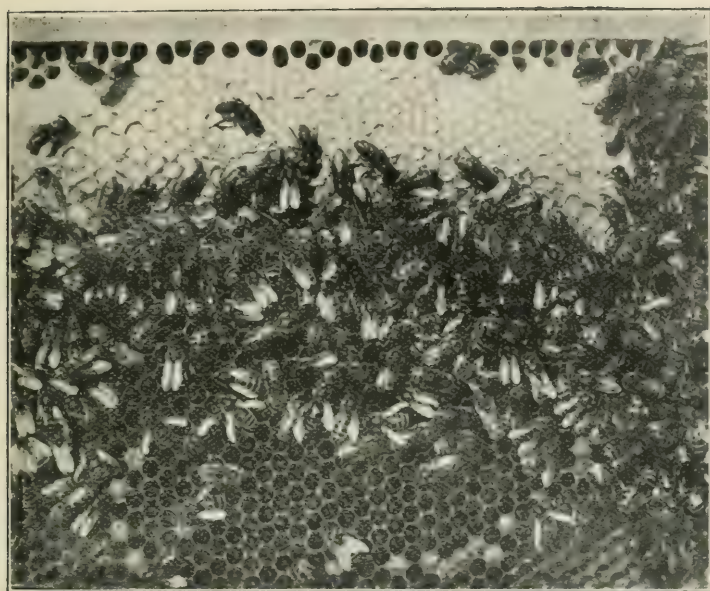


CHAPTER III.

THE ECONOMY OF THE HIVE.

DESIRING to place a few important matters before the uninitiated reader in as simple a manner as possible, I will begin with the establishment of a new swarm, and explain the various phases of its existence until that in its turn is prepared to send forth its own increase.

Presuming that our swarm has been duly hived in movable frames, each of which has a wax guide down the centre of the top bar, we shall find that the bees begin to extend themselves in festoons from the highest point should the hive not stand on the level ; if perfectly flat, then the cluster is formed near to one side, and forthwith waxen cells are added to the guide placed to ensure straight building. If the weather is favourable, the delicate white comb will be found to increase rapidly in semi-circular form, until the centre reaches to within $\frac{1}{4}$ -inch of the lower rail of the frame, when the side spaces are soon filled in. Sometimes combs will be started in different places along the guide, and as the circular edge of each nears its neighbour, these are joined, and the



Bees at Home.

From a Photo]

[by Mr. Claude Flight.

several united continued as one comb; but in this case we may frequently observe many irregular cells at the line of junction.

By using a sheet of glass next above the frames, or better still, my glass rail sections, kept warm with woollen material, the interesting operation of comb-building may be watched. Many bees will be seen with strips of wax just removed from the "wax pockets" on the under-side of the abdomen, and this they are moulding into shape as added to the thick rim on the outer edge of the cells. This rim is always present, not only as a reserve of wax for lengthening the cells, but more especially for giving strength to the structure, and the better to withstand the tramp of many feet; the actual cell walls being as fine as tissue paper. With a few exceptions, as when joining two combs, or where drone cells meet those of the worker size, each cell is hexagonal in shape, with a base composed of three irregular squares, so that the centre point of contact is deeper than the sides; thus, the centre of the base of the cell comes opposite the junction of three walls on the other side of the "septum."

The natural distance from the centre of one comb to that of the next is $1\frac{1}{2}$ -inch. It is not, however, absolutely necessary that this gauge should be retained, and it will be found by making the distance $1\frac{3}{8}$ -inch to $1\frac{1}{4}$ -inch when starting new combs that the bees will build them almost entirely of worker cells—five to an inch. When the natural distance is allowed, many larger cells are constructed; these are for storage or for the production of drones or males, their measure being four to the inch.

As soon as the combs are sufficiently advanced, the queen deposits an egg in each available cell; this remains for two days, when the workers add a milky fluid; and it may be taken as a fact that no matter how high the tem-

perature these eggs will never hatch without the addition of such fluid. In the Spring eggs laid in drone cells may be seen day after day, week after week, during unfavorable weather, simply because the workers do not see fit to have them develop, and in late Autumn exactly the same thing will occur with worker eggs laid in worker cells. The queen is allowed to deposit them, but the workers as much as say "No, they shall not hatch only to produce useless consumers."

On the third day the egg hatches, and the tiny embryo floats in the liquid, to which the bees continually add, until the seventh day, when the larva surrounds itself with a silken web, its cell being then capped over with a porous mixture of wax and pollen. According to Cheshire many more important changes then take place than hitherto have been supposed, and the student of nature will find much pleasure in perusing his work.* When fully developed, the insect bites its own way through the cap on the twentieth day after the egg was laid, and is readily distinguished by its light downy appearance. It immediately proceeds to the open cells of honey, and helps itself liberally. The youngster is generally assisted by an older bee in removing the filmy skin from its body, and after two or three days it goes out for a cleansing flight at the warmest part of the day, at the time many others are having an airing and taking stock of their surroundings. This flight of the young bees, when they are of the bright yellow varieties, is an interesting and beautiful sight.

Our little friend gets stronger daily, and, soon after the seventh day we find her coming home with a load of pollen on each back leg in what are called the pollen-

* "Bees and Bee-keeping," Vol. I., Scientific.

baskets, being hollow parts in the legs, with strong hair so overhanging that the load cannot fall. She enters the hive, travels up the comb to near the margin of the brood nest, and after finding a convenient cell, in which quite likely pollen has already been deposited, she pushes off her load with the middle legs, which Cheshire has shown have a peculiar instrument adapted to the purpose, and which is passed down the hollow behind the pollen, and thus it is forced off into the cell. The bee will then turn round and entering the cell, presses the pellets down into a thin layer, where probably many such are already placed, varying in colour according to the nature of the plant they may have been gathered from. It is well-known that the bee nearly always confines itself to one kind of flower when out foraging, hence its load of honey is of one kind only and the pollen is of one colour ; the bee-keeper may therefore frequently tell what his bees are working upon by carefully noting the colour being brought in. Thus mustard gives yellow pollen ; white clover, brown ; red clover, dark brown ; sanfoin, brown ; willow, yellow ; furze, dark orange ; dandelion, bright orange ; apple blossom, light yellow ; pear, crimson ; poppy, black ; blackberry, greenish white ; while the various garden flowers give every conceivable shade.

It is but seldom a bee gathers a large load of both pollen and honey on one and the same journey. A pollen gatherer will have little honey, while those carrying the most honey will seldom stay for a particle of pollen, more than what may be brushed into honey as collected. The pellets are brought in most freely up till 11 a.m. while everything is moist from the dew of night ; or at any time, immediately after a shower, if warm. The honey sources of the day are about dried up by three p.m., and the bees do not often work actively after that time. As in the early

morning, they then carry in much water to help in preparing the food for the young, a mixture of pollen and honey, first digested by the nurse bees, or those not yet old enough for outside work, and given to the unsealed larvæ as a milky fluid. During the warm part of the day, not a bee will be found at the water fountain if there happen to be a heavy flow of honey ; but should there be a scarcity, many will be carrying water the whole day ; even if it be raining they continue their flights to the same spot by force of habit. It is, of course, understood that bees must have honey (or syrup), but, do not at any time lose sight of the fact that in building up in Spring, it is absolutely necessary that they have both *pollen* and *water* as well.

Substitute for Pollen ; Water Supply, &c.

If there is any sign of scarcity, nitrogenous food can be given in the shape of a thick paste, formed by mixing pea-flour with good honey (syrup will not answer, as it simply cakes into a hard lump) With a thin broad stick press this into the cells of a tough comb to the extent of half of one side and place the same next the cluster. The pea-flour may also be dusted into the comb in a dry state, or in that form shaken upon shavings, placed in an old skep or box. Water can be given in large milk pans, either with sawdust at the bottom ; moss ; or wood to float as a resting place ; taking care that the vessel shall stand in a warm, sheltered spot.

Young Bees take their Share of Work.

The honey gatherer will generally give up its load to the younger bees, returning at once to the fields, and it will be found that during the day the hives contain, almost exclusively, the younger bees not yet able to

work outside, and as these do most of the comb-building as well as store the honey, have we not here the reason why the pollen is so seldom found in new stored combs? Of course, we know that pollen is required near the brood nest, but much of it is purposely stored and covered with honey in view of future requirements, and if the load could be transferred, as the honey is to the younger bees, we should not be able to reckon upon the almost total absence of that article from our comb honey.

That the young bees do take so large a share of the work, as explained above, shows remarkable economy of labour, and disproves the theory that there is no benefit to be derived from brood hatched out less than three weeks previous to the probable close of the honey harvest. During a heavy flow, which implies, of course, very warm weather, I have seen hives with none but newly-hatched bees at home, proving also that upon an emergency young bees begin to carry much earlier than is often supposed. The fact is, from the time surplus receptacles are put on, the production of brood should be limited to the capacity of nine "Standard" frames. That number of combs crowded with brood, except for the usual quantity of pollen stored, will represent the population needed to make up for the continued wear and tear of bee-life, and to keep the stock in good heart after the hard work is past; as few of those which have gathered the stores are to be found within three weeks after the close of the season. Examine the hive, and you will find every field worker has its wings more or less worn; look again, after the interval named, and they are gone.

How the Honey is Stored.

We will now watch a bee relieving itself of the nectar brought in. Should she select an empty cell, she first

assures herself that it is quite clean, and then beginning at the base, with her tongue she commences to "paint" the same with the honey slowly leaving that organ until the first load completely covers the three squares. Another load is brought, and the next bee continues the operation of "painting" the sides of the cell, but only so far as it is necessary to accommodate her own load which she is slowly disgorging. In like manner each following bee continues the process, until the cell is nearly full, and the mouth of the same is gradually sealed over with pure wax. It will be readily understood that were it not for this process of moistening the sides of the cell, the honey would not always adhere to the dry surface, and hence much waste space would be the result. Much of the honey does not, however, remain where first placed. If the bees have room in the stock combs, it is distributed as much as possible, and when the excess of moisture is evaporated it is carried above.

The bees that leave an air space just under the capping are Blacks, Carniolans, and some hybrids. Ligurians give a thinner sealing and are not always so careful to retain the clear space, but their comb honey is quite presentable and of a really fine appearance, though that of the former is often preferred for its snowy whiteness. Cyprians, Syrians, and Palestines, however, leave no space whatever; in fact, it would appear that they even moisten the inside of the cappings, and fill the cell as tight as possible, hence their comb honey is not at all saleable. The reader will therefore use his own judgment in the matter, and only work those stocks for comb honey that are known to produce the whitest comb surface.

As soon as the wants of the rapidly increasing brood nest are supplied, stores begin to accumulate, and presently we find the upper portion of the central comb

filled with honey and neatly capped, while one or more of the combs at one or both sides will often be a solid block of honey. Meanwhile the population has been entirely renewed by the brood hatching in successive batches, but presently no more store is to be gathered, and then the drones are destroyed ; the size of the brood nest is greatly diminished, until by September brood rearing ceases entirely, unless there be a queen of the current year, and in that case, with plenty of food on hand, it will be continued until late into October. The whole of the stores accumulated by a swarm thus left to itself will seldom exceed 20 lbs., but let the reader compare this with the product of a swarm worked as explained under " General Management," and he will find that there is but poor economy in the " let-'em-alone " policy.

As the cool weather comes on, the bees which but lately appeared to fill the hive, crowd into a compact mass, occupying not one-tenth of the space. The winter cluster is formed where brood has lately been hatched, towards the central lower part of the comb ; thus the bees are able to enter these cells, head to head on opposite sides, as well as cluster between, forming an unbroken mass, and so keeping up the necessary temperature. In this state the bees do not rely upon any outside covering other than simple protection from direct draught. The older the combs the more protection is afforded in Winter ; but one wall of the hive, at least, that on the south side, can hardly be too thin, as an occasional gleam of sunshine penetrates at once, and so enables the bees to shift their position, and re-arrange the stores around the cluster, even though the temperature may be too low for any to fly out. Therefore, wherever the entrance may be placed, it is absolutely necessary that the frames of comb shall stand end on to the south wall.

Providing pollen is at hand, breeding commences in all good colonies soon after the "turn of days," but at first the patches of brood are small, and limited to the very heart of the cluster, to guard against chill. It is not by any means to be supposed that henceforth young bees are brought forth without intermission; but it is a fact, nevertheless, that a colony, failing through any cause, to produce this early batch of youngsters, will stand in the background all through the season, as presently the loss of bee-life will be so great that a late hatching of young ones cannot possibly keep pace with the deaths occasioned by almost daily flights. On the other hand, two or three generations of young bees brought to life before general flights occur, give a colony so great an advantage that no perceptible diminution occurs, and by the time spring opens, the population has been *almost entirely renewed*, so that henceforth the progress of that stock is rapid.

Presuming that the colony we have had under consideration, has plenty of stores of both kinds, and a good queen at its head, at the approach of May some of the large cells have eggs deposited in them: these also hatch on the third day, and the larvæ then undergo much the same process of change as does the worker, though each condition is more prolonged, and it is not until the 25th day that the perfect insect begins to bite a way out from its cradle. Nearly every one has heard of these burly fellows, but people generally appear to consider that a drone is so called simply because he will not work; but the fact is he cannot work, and has nothing in common with the worker, the latter being a neuter and its whole organism so constituted as to fit it for work alone, while the drone is exactly the reverse, and being the male its sole occupation is that of fertilising the young queens brought to life

during the swarming season. It is therefore in view of this colonising instinct that the drones are now brought forward; this being the first indication that a stock is expecting to swarm at no distant date. If we suppress the production of drones then, by allowing no drone comb, one step is taken towards the prevention of swarming; it being well known that those colonies having few or no drones are the least inclined to swarm.

Royal Cells.

The next and more important step taken by the bees, is to build special cells, either on the surface of the combs, or more often around the edges, something in the shape of an acorn; indeed in their first stage, they are almost an exact counterpart of the cup. They may remain in this state, as they often do, for many days if the weather is not quite favourable; but in due course the queen deposits in each an egg when the cell walls are extended downwards, and as soon as the tiny larvæ hatch from these they are fed excessively upon what is called "Royal Jelly," a substance much thicker than that given to the common larvæ. From the sixth to the seventh day the developing insect has its cell capped over; it then spins a cocoon which does not completely surround itself, as the abdomen is not covered, and strange though it may seem, it is just there that the cell is torn open, and the immature queen stung to death by the first hatched young queen, when the workers decide that the rest are not wanted.

On the sixteenth day from the laying of the egg the perfect female, or a bee destined to be the mother of tens of thousands, emerges from the cell, though she is not fulfilling her destiny, until being established at the head of the old colony or one or other of the after swarms, she

mates with a drone when about six days old, and on the second day after begins to deposit eggs in the worker cells only. Contrary to the opinion of some writers, who affirm that a young queen is incapable of producing drones the first year, I have repeatedly had cases in *prosperous* colonies where a queen not two months old produced drones. Nevertheless, it is the rule for after swarms, having young queens, to build only worker cells the first season, hence no drones can be produced, and this would account for the erroneous conclusion arrived at by the old writers. Of course there is a lesson to be learnt at this point: "When wishing to obtain worker combs without the aid of comb foundation, insert young queens at the head of those stocks used for the purpose." But we have to note the

Condition of a colony nearing the swarming point,

and therefore must return to the period when the queen cells are being capped over. The old queen shows signs of restlessness, and were she permitted would gladly destroy the inmates of the Royal cells, though only a few days previously she needed but little persuasion on the part of the workers to deposit the eggs in those very cells, soon to become her own rivals and deadly enemies of each other. It is not always the case, but it sometimes happens that the bees cease to stimulate the old queen to egg-laying at this stage, and hence she is better able to fly, as her ovaries are much reduced in size.

The bees have not always time to finish capping all the queen cells started ere the excitement culminates in the issue of the first swarm, the old queen coming with them, seldom first or last, but generally when half of the bees are on the wing. Bees of all ages come out, including those but just emerged from the cell. If the weather is

warm, even these soon gain sufficient strength to fly and settle with the swarm ; otherwise, if they cannot crawl back to the hive, many will perish ; thus showing the necessity of a wide board reaching from the ground to the entrance, not only in this instance, but at all times, as many adult bees are lost in failing to reach the entrance during chilly weather. The workers out in the fields at the time of swarming and the large numbers of young hatching, soon make up the strength of the hive and prevent the remaining brood getting chilled.

Securing the Swarm.

If the apiary be located near high trees the swarms (if permitted to issue) will sometimes give trouble by clustering in them ; though they may as often settle upon any low shrub, or even a post or wall. In the former case a straw skep must be carried up and the bees shaken into it when inverted under the clustering mass ; descend the ladder as rapidly as possible, keeping the skep the same way, and then turn it the right way up on to a sheet previously spread upon the ground, with a brick or piece of wood under it, so that one edge of the hive may be raised to enable the flying bees to draw in. Where the cluster is formed on a wall or any other like place, brush the bees off into the skep with a wing ; but if among branches of wall trees, little can be done in that way, and they must be driven up into the skep as it is fastened above them, by the use of smoke ; or, better still, make everything more certain by first capturing the queen and secure her in a cage fastened under the edge of the skep when placed on the ground : in this case if only a handful of bees can first be brushed into the skep, all the rest will follow. On no account, in any instance, expect the bees will go up of their own accord into a hive placed above

the cluster ; it will only cause waste of time and disappointment ; it has to be done, therefore carry the thing through at once.

Hatching of the Young Queens.

In about nine days from the issue of the first swarm, one of the young queens bites her way out of the cell, leaving the cap hanging attached at a part of its edge ; this covering will sometimes get back into its original place and be again sealed by the bees, and should a worker be in, clearing out the residue of food at the time, its fate is sealed in a double sense. Such occurrences, simple to a careful observer, have at times given rise to unfounded theories ; but at the same time it shows how it is quite possible to leave a useless queen cell in the hive when cutting out all but one to prevent after-swarving ; a wanton waste of time, by the way, which cannot be tolerated in a modern apiary.

The young queens may be ready to hatch, they may even bite all round the covering of their cells, and yet not be allowed to leave them, should the weather be unsuitable for swarming, so that when the favourable moment comes several leave their cradles at the same time, and are quite ready for flight, but as a rule the first hatched young queen leads off, or rather goes with the second swarm ; though the after, and sometimes even the second swarm, is accompanied by more than one virgin queen. Though I am well aware that such queens will, if placed together, immediately fight until one receives its instantaneous death wound ; when several accompany a swarm, or in case two or more swarms settle together, each having a fertile queen, the bees themselves settle the matter by "balling" those not required. After the hive is so weakened that the bees know it is useless to attempt to swarm again, or should the weather be unfavourable, the queens still

unborn are destroyed, as I have reason to believe, by the workers tearing open the side of the cells and there stinging their helpless victims, or tearing them out piecemeal.

Young Queens Piping.

This peculiar sound will always be heard during a day or so before the issue of the second swarm. The sound appears to be an answering call or challenge from one young queen to another, and strange though it may seem, if the colony is still populous, several of these young queens may be running about the combs at the same time without harming each other. But that is not all, this sound or call has a magnetic influence over the workers, who appear spell-bound, themselves being held motionless and flattened on the combs, in imitation of the queen's own action and attitude, while piping. This I have repeatedly noticed while holding the comb in my hand.

Within seven days after the issue of the first swarm there are no more uncapped larvæ, and therefore no more feeding required from the nurse bees until the last remaining queen is laying, a period of about twelve days, so that if excessive swarming is not indulged in, stores continue to accumulate while there is a reduced force to gather it. It is well that this is so, as the young queen is generally so very prolific that unless the workers can get in advance of her requirements at the start, they are liable to reach winter with no stores on hand.

I have here shown in a general way the natural condition of a swarm during one year of its existence, but under modern management the state of things will be much altered; at the same time I hope the foregoing will enable the uninitiated reader the better to understand and follow such methods as will hereafter be described.



CHAPTER IV.

VARIETIES OF BEES.

THEIR CHARACTER AND DISPOSITION.

IT will be my endeavour to give an impartial account of the different varieties as I have found them; and while drawing attention to the great value of the foreign races for crossing with the bees we already have, I must advise the reader not to invest heavily in either of such varieties, but first obtain two or three queens and then compare them with those he already has for several years before making any radical change.

THE BLACK, OR NATIVE BEES,

are still cultivated in many apiaries, principally because they are well adapted to the production of comb-honey. Their newly-stored combs are beautifully white, and therefore comb-honey produced by them commands a good sale. They are not so prolific as other races, and hence do not give as much surplus, and consequently are of little use in an apiary where increase is desired; indeed, I can assert as a fact, the bee-keeper who expects to build up a large and prosperous apiary from black bees alone,

will be certainly disappointed. When, however, he has all the stock he requires, no objection can be made to the use of this race where comb-honey alone is sought for, but even in that case, it will be found more profitable to introduce some foreign blood.

Though, generally, the hives are less populous than those of other kinds, these bees have several good qualities. The young commence work outside at a much earlier age than do some of the yellow races; they have great conservative energy, and a given number will produce and maintain a much larger amount of heat than the same number of some of the other cultivated races. Here is the reason why these bees are good comb-builders, and ready to take to the supers.

To Perpetuate their Working Qualities,

I have found it necessary to breed from a queen of the native kind, crossing with a yellow drone; the act of crossing in itself adds greater energy; while the disposition is received from the male side. For instance, a queen of a mild strain mating with a drone from a vicious colony I have noticed throws workers which almost invariably turn out to be irritable. Again, I have had queens produce workers that the average bee-keeper would not attempt to manipulate under any kind of intimidation; and yet the daughters of such queens allowed to mate only with drones from stocks known to be easily handled, have given workers that one could do anything with.

I have found many black bees more irritable than any I have ever had, even rushing from the hive to attack a person many yards off; but by crossing the queens with Ligurian, or Carniolan drones, this disposition is corrected. It has been considered that hybrids are very vicious, but this is only half true; what I have stated above is strictly

in accordance with fact, but when a yellow queen of some varieties is allowed to mate with a black drone, then, of course, the progeny resulting therefrom will be irritable, while their working qualities will be inferior to those of the cross recommended. Black drones are not required in breeding up a new strain, and should be rigorously excluded.

Native Bees and Foul Brood.

Nothing is so disheartening to the experienced bee-master than to see a bee-keeper clinging to native bees in a neighbourhood where foul brood is prevalent, and where he is, therefore, constantly subject to that complaint, and is always destroying good material, with no hope of ultimate profit.

Natives have several faults, apart from a rather bad temper. They are not sufficiently prolific, and do not store so late in the season as do Italians. But beyond all, they are helpless in the face of foul brood, and will not even work with their owner when he attempts to cure the malady.

LIGURIAN, OR ITALIAN BEES.

These were the first yellow race introduced, and though much abused in some quarters, they have gradually gained ground until there is perhaps hardly a district where the native bees have not to some extent, more or less remote, received some benefit by the infusion of fresh blood. Indeed, it is amusing to hear some apiarists assert that Italians are inferior to the old-fashioned sort, and that they will have no more of them ; when, as a matter of fact, their original stock has been greatly improved by the introduction of the foreigners, short though their existence may have been ; and, moreover, the probability is great

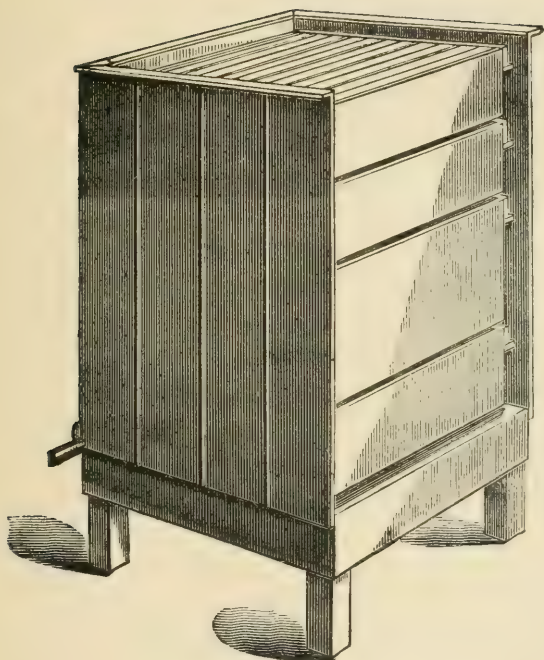


FIG. 5.

The "Conqueror," having the stock chamber, and three supers of divided sections and frames. Shewn with cover and back removed.

that year after year such short-sighted men are indebted to some distant bee-keeper for the continued excellence of their blacks (?); as the new blood is carried from one apiary to another, through successive stages during succeeding seasons; each cross showing less of colour, until in the end there is scarcely any evidence to show that the dark bees of the neighbourhood have foreign blood in their constitution.

The advantages claimed for Ligurians are as follows: They are more prolific, and consequently gather more honey than blacks, more especially as they can work upon some flowers not accessible to the others, and continue to gather until Autumn is well advanced. Strange to say, natives often do best early in the season, but in Autumn I have known Italians draw out foundation rapidly and store heavily, while at the same time the former would not attempt to work upon a sheet of foundation placed in the centre of the brood nest. The Italians are more gentle, and together with their beautiful markings, this has done much to make them popular.

They are considered to be an all-purposes bee, but the comb-honey stored by the imported bees is not quite so good as that of the native kind: they are not equal to the latter as comb-builders, and are often hard to persuade to enter the supers; while they are unsuitable for queen-raising purposes, unless great care is taken, as they will start but few cells. A mixture of the two races, however, as previously stated, will give energetic workers, but unfortunately having very bad tempers.

As with all yellow races, Ligurian workers have three yellow bands on the upper part of the abdomen, beginning at the first segment. Creamy white lines of hair follow the broader yellow bars, down to the extremity of the body, giving the bee a handsome appearance. The queens

vary in colour from dark to light yellow ; while the drones sometimes have patches of yellow on the abdomen, and others are hardly to be distinguished from those of the black kind.

By a careful selection of the queen mothers, and by mating them to selected drones, I have been able to show, as in my own strain of Italians, that these bees are capable of vast improvements, producing workers ever ready to take to the supers, being great comb-builders and heavy gatherers ; while one remarkable feature is that the hybrids from this improved strain are not vicious.

Italians and Light Honey.

A notable feature in connection with these bees, is a fact which I have noticed for many years. While common bees may be gathering honey-dew or other dark honeys, these bees are at the same period producing honey of the clearest whiteness. They evidently are able to work on flowers which the natives are unable to make use of,

CARNIOLANS.

Scarcely a fault can be found with Carniolans, and while they are not quite such good honey gatherers as some others, few can compete with them for colour of comb-honey. It has been stated that they swarm immoderately, and this is where they have failed in public estimation. There is one thing, however, which would give that impression ; the demand for imported queens has been so great that I am afraid many old queens have been sent over, more especially as few of the native holders make any attempt to raise queens for the market. Therefore, in the natural order of things, the old mothers

would be superseded, and a number of swarms come forth headed by young queens. Where old queens are avoided there is less trouble with these bees in that direction.

They are so very prolific that considerable attention is required just at the critical time, in giving plenty of room, and free access to all parts of the hive.

One great point in their favour is their good temper. Without smoke, or other intimidants, hive after hive can generally be opened, and no stings are received.

Carniolans are very active during the summer months, and yet are restful when confined during winter ; in fact, they come from a cold mountainous region, and there is, therefore, no doubt either as to their energy or good wintering qualities. It is reasonable to suppose that they at one time were a cross between Cyprians and the German bee ; the Cyprian element, however introduced, must have subsided, and the colour reverted to that of the majority, though the extremely broad white bands on the latter segments of the abdomen of the yellow race have been retained, thus distinguishing the Carniolans from blacks.

The queens vary in colour from yellow to black ; some being "ringed," the colour of the abdomen shading alternately from light to dark, but all produce workers of the typical sort, having on the abdomen near the thorax a mere shade of bronzed yellow, and then follow several extremely broad white bands, giving the bees an attractive appearance.

Many of the queens imported throw workers having one or two distinct bands of yellow, which shows that either the native bee-keepers have introduced some of the yellow kinds, or that the ancient admixture of yellow blood is still strongly in evidence.

CYPRIANS.

Among the yellow races these were at one time expected to take the front rank. Though not suitable for the production of comb-honey, they are very active honey gatherers and extremely docile, while their great beauty is undeniable. They have three bright yellow bands on the abdomen, followed by broad bars of light yellow hair. Unlike Ligurians, the yellow extends to the under-side of the body, as it does also in a less degree with Syrians. The body is much smaller than that of the native variety, tapering to a fine point, quite unlike the more rounded form of the other.

After an extensive experience, however, this variety has been discarded, as their faults far out-balance their virtues. Hybrids from these are more vicious than any, while both the pure race and the hybrids have a very bad habit of starting fertile workers, either with or without a queen. This was so serious a matter in my queen-rearing apiary, that I finally discarded them some seven years since.

SYRIANS.

These are, in appearance, much like the foregoing, though of a darker shade, and sometimes are not so well marked as Ligurians, though always yellow on the under-side of the abdomen. Instead of having cream-coloured bands of hair like Cyprians, these have corresponding bars of a bluish white colour, much like the Albinos supposed to have been bred from an off-shoot of the Ligurian variety; while some condemn Syrians as utterly unmanageable, others claim that they have many valuable qualities.

I have found among them queens producing workers almost unmanageable, while a larger number gave bees that could be handled like flies. How misleading, then,

is it for persons who possessing only one—or perhaps two—queens, which upon throwing irritable workers, are induced to condemn the entire race, and thus prevent many from obtaining what would prove a really valuable acquisition. The whole matter resolves itself simply into this—select those of gentle disposition and breed only from such, destroying any queen which throws disagreeable bees.

PALESTINES.

These are, perhaps, more yellow and beautiful than Cyprians, but can hardly be recommended, as they develop fertile workers to a greater extent, use more propolis than any others yet named, and while being handled have a very disagreeable habit of biting the fingers. These have often been confused with Syrians, but the two are quite distinct : Palestines come from the Holy Land proper, while the others are found farther north, in the Lebanon mountains. However, very successful results have been secured from a large apiary of these bees, in their native country, by Mr. Baldensperger, when in Jaffa.

Other Varieties

have been brought forward from time to time, including the South African, Caucassian, Minorcan, and Punic or Tunisian. The first named are merely hybrids varying (in the same colony) from three yellow bands to almost black in colour, with the usual lighter bars of whitish hair between each segment of the body, in this case of a peculiar ashen-white colour. The queens are almost black, while the workers are smaller than those of any other race cultivated. A number of undesirable traits, apart from being hybrids, prevented their general introduction.

The Minorcans were freely offered for sale in this country, but these again, though similar to our native race,

had no merit of sufficient value to claim the attention of practical bee-keepers, and hence gained no favour.

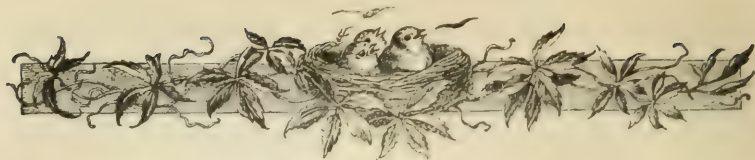
The Tunisian is another of the darker varieties which, however, at one time came in for some notoriety, through commendations accorded it by an advertiser in the *Bee Journals*. The race has been proved inferior to our native variety, and Mr. F. Benton, who first sent out queens of the kind from Tunis, has the following to say about them in a letter to myself:

"I always called them by the most natural name—Tunisian, and never thought best to strain after something a bit fanciful like "Punic." Perhaps the party who got up this name had in mind the ancient "Punic faith" in which this race resembles that of the old Carthaginians—for when you least expect it, *i.e.*, when they have been well, and even royally treated, they will sally out and cover the manipulators with their tiny javelins. They carry in more propolis than any other race, and are poor winterers. I handled several hundred colonies two different seasons in Tunis; took some to the Orient with me, also had them tested in Palestine, and I tried them in Munich, and came to the conclusion that in no way do they excel Cyprians, and in some points they are behind that race; would therefore advise to let Tunisian (Punic bees) quite alone."

After trial with several imported queens of this variety, I unhesitatingly condemn them as being the most degenerate variety of bees ever introduced. Smaller than any I have cultivated, black as ink, excitable, exceedingly disagreeable to handle, and the poorest honey-gatherers I have known. All through the finest bee-weather, while other stocks were storing rapidly, the North Africans, in far larger numbers, stored barely enough to live on; but here, there, and everywhere, these bees were idling around all the time in the attempt to rob.

The novice should be careful about investing in new varieties of bees, unless he can see some tangible evidence of superiority upon a limited trial, or he is convinced by independent testimony that he is running no risks in changing his stock.





CHAPTER V.

HOW TO OBTAIN GOOD WORKING
STOCK.

IN all apiaries it is found that a certain colony, or perhaps a few stocks, surpass all the rest in the amount of honey collected ; and the remark is often made that of two colonies standing side by side, apparently equal in every respect, one gave a large surplus while the other did almost nothing. Reader, let us reason together, and see if it be not possible to explain the apparent mystery. As a matter of fact

The Whole Secret of Successful Honey Production

consists in always maintaining the proper proportion of adult working bees in relation to the quantity of brood and young bees on hand. Here, then, can be discerned the difference. One colony was so favourably constituted that the queen was able to produce the full working force *before* the honey flow came on ; while the other could not breed to her fullest capacity until *after* the season commenced. In the latter case the working force is unable to do much more than keep the rapidly increasing brood nest and large population of young bees supplied. With such an undue proportion of consumers on hand the queen now has it all her own way, and her combs are one mass of brood.

The colony which gained the proper balance of population at an early date, on the contrary, has much reduced its brood nest by storing some honey and large quantities of pollen. This is the hive which will give the heavy surplus, and the other can never compete with it, even though it has twice the population. Of course excessive breeding can be to a certain extent modified by contracting the size of the brood nest, but nevertheless the actual working force will not be in excess until the season is far advanced.

We must now consider the causes of such a wide difference. They are many, one of the first being that the queen may be stimulated to breed too late in the autumn; consequently she will be late to begin breeding the following season. The hive may have been short of stores, or the combs so overloaded in early spring that there was really no chance for the bees to develop the brood nest. Perhaps they were thrown back by being too much exposed, instead of having warm material above them. In either case an early hatching of young bees would be out of the question; and these are the mainstay, compensating for the loss of many veterans when frequent flights become necessary. Consequently the best powers of the queen are not expended before the season opens.

To obtain good Stock,

it is absolutely necessary that one keep only the very best queens—young, highly prolific and well developed. When I mention young, I mean just what I say. How wasteful and unnecessary! you say; but I assert as a fact that to enable one to keep his stock *generally* in the highest state of efficiency, he must retain no queens that have seen their second summer. Take a queen raised even so late as August; she will be in full profit the following season:

keep her till another season and her colony will be hardly second-rate.

To be prolific a queen must not simply keep pace with her workers while building up in preparation for the season, but must actually force them to make room for her. Such queens are to be had, and with them no "brood spreading" by the apiarist is necessary. A well-developed queen is more hardy and energetic than a smaller one; and, as a rule, will get mated in risky weather when twenty inferior queens fail to meet a drone.

The finest queens are obtained from young mothers. A queen is in her highest state of excellence soon after she commences to lay, and can be used for breeding other queens, if from stock of known excellence, as soon as it is found by her hatching bees that she has mated correctly.

Queens cannot be too Prolific.

I am aware that there are some bee-keepers who consider that a queen can be too prolific. It may be so with their management, but as a simple matter of fact the more prolific the queen, the larger the surplus stored, *but* one's management must provide that she does her best before the season opens; thereafter she will simply keep pace with the wear and tear upon the life of the workers.

It will be asked, "And how are we to provide that the best powers of the queen are to be used up before actual storage commences?" Some important matters having reference thereto I have already given; but one way of doing this is to unite two or more colonies, making them very strong in the Autumn whenever it is found stocks are at all under full strength. Another plan is that of uniting about ten days before the season is expected to open, and thus in either case providing that the number

of actual gatherers shall presently be far in excess of those required to attend to the young.

As a rule, especially where no honey is obtained after July, the best results are secured by preventing the issue of swarms, unless obtained from three to four weeks before the first honey flow is usually expected ; but nevertheless, unless

The Equivalent of Swarming

is allowed, our stock must deteriorate as a natural consequence. Therefore select one out of every ten colonies and devote it to queen-raising (see chapter on same), and allow one nucleus with a young queen to stand by the side of every stock. By the Autumn such nuclei will have themselves become fairly strong, when the old queens can be destroyed and the two lots respectively united in the evening of the following day.

Having studied the general rules to be observed if we wish to have only good working stock, we must now consider which are the

Most Suitable Bees

for our purpose, whether we intend to work them for comb or extracted honey.

The advantages to be derived from the foreign varieties can hardly be over-estimated, for by crossing with queens of the native kind, we get greater fecundity, and better honey-gathering powers than either pure race possesses. In the former chapter I have already shown that a black queen may form the basis from which to build up a good working strain. Select such queen of known excellence, and for the production of comb-honey use Italian or Carniolan drones to mate with young ones raised from her ; the first cross being the most suitable.

For extracted honey a good Italian strain will be found to give the best results. Pure black bees are not at all desirable for either purpose, as they cease storing quite a month sooner than the foreign varieties or hybrids ; moreover, they are frequently troubled with the wax moth, while the latter never are. Let it be observed that black (native) drones are to be rigorously excluded, as these give bad-tempered workers when crossed with a queen of either of the foreign varieties.

In concluding this chapter, I must insist that unrestricted or indiscriminate swarming, as hitherto generally practised, *is totally at variance with all true principles of breeding*. To obtain the best results, it is absolutely necessary that all queens be carefully bred from the best stock only. Our motto should be "Excelsior !"





CHAPTER VI.

PLANTING FOR BEE-PASTURAGE.

NINE years out of ten we have a fine Autumn spell, after the usual flowers have succumbed ; and the bees having nothing better to do, are in too many cases on the alert for the least chance to rob a neighbouring hive.

How often has the bee-keeper wished that such fine weather, so enjoyable a period, might be made a time of busy labour to his now idle thousands, so that they might take to the more pleasant paths of industry and good behaviour. Oh ! for the magician's wand, that flower laden fields might spring into existence and waft their honeyed odours to the still crowded hives. What a marvellous change should we behold ! Instead of robbing, worrying and fighting—the industrious hum of roaring thousands—in place of shrinking stores, we shall see every open cell glistening with the golden nectar, and the winged multitudes darkening the air as they speed in shoals to and from the honeyed mine of flowers.

And yet, dear reader, this is all quite possible. Why should man sit down helplessly, and remain content with the shortcomings of his locality. 'Tis not Nature that is at fault, but man's own want of foresight and ingenuity. Do you expect to make bee-keeping a success on a large

scale? Then there is only one way that will do it in this country. You *must* plant intelligently. By the acre? Aye! by the tens and hundreds! Then will you pile up half-a-dozen supers where now you have one. You will have no more Autumn feeding, and no more unpleasant robbing.

Estimate of Honey per Acre.

It has been estimated that an acre of white clover yields some 10lbs. of honey per day. Suppose we allow the ordinary local resources to support a medium number of stocks, say 100, and take only our specially planted fields for the surplus. We will plant say 5 successive crops each of 20 acres to yield 200lbs. per day, for say 5 months of 20 honey days each crop, that will be for 100 days 20,000lbs. of honey from 100 acres and allowing one month only to each crop.

Less than 100 colonies would gather this from special clover crops close at hand, but we have to allow for the natural yields as well, and must not make the expenses too small. The 20,000lbs. at 6d. would work out at about £500.

And now the cost.

	£	s.	d.	£	s.	d.
Rent at £1 per acre will be	100	0	0			
20lb. seed per acre average 10d., and sowing ..						
say	100	0	0			
Ploughing, rolling &c.	100	0	0			
	<hr/>					
	300	0	0			
Profit				200	0	0
Hay, 100 acres, say 100 tons at £3 equals ..	300	0	0			
Less haying £1 per acre £100	200	0	0	100	0	0
Less manure £1 per acre £100						
	<hr/>					
Total, profit first year				300	0	0

Now some of these crops would last several years after first cost of sowing, while the cost of cultivation would be almost nil for a time, and less manure would be required. Thus taking the 2nd year we have

				£	s.	d.	£	s.	d.
Honey	..	..	..	500	0	0			
Rent	..	..	..	100	0	0			
				<hr/>					
Profit				..			400	0	0
Hay 100 acres—100 tons									
at £3 equals	..	..		300	0	0			
Less haying	£100								
Manure	..	£100		200	0	0	100	0	0
				<hr/>			<hr/>		
Profit							£500	0	0 2nd year.

Now a month is a short period for some crops to be in flower. I shorten it to 20 days, allowing for cutting. But I have shown nothing for honey from the second crop of blossoms, nor yet for the second crop of hay, both of which many of the clovers will give in one season. But against this there may be a set-off in the fact that a part of the rotation of bee-crops may not be hayed at all, though in that case it would be such as remain in blossom for six or eight weeks at a time, while, of course, the yield of honey would be greater. Taking the whole matter into consideration, the estimate as to the profits from planting must appear very moderate indeed.

This is simply an estimate of the lowest possible profits to be secured where crops are sown for the use of 50 to 100 colonies of bees. But this quantity of ground could not be so cultivated without an additional profit to be secured from grazing and otherwise feeding cattle; a process which would more than double the proceeds. An average of only one ton of hay to the acre is shewn, but it

is no uncommon thing to secure, as I have done myself, two tons from a first crop, and one ton from the second crop in one year.

Manuring the Ground.

Nevertheless, it will ever remain a prime factor that the ground must be moderately good to start with, and must be kept up in good condition, otherwise the bee-keeper's attempts to supplement his local surroundings will meet with grievous disappointment; just as any other tiller of the soil must fail utterly if he will not reward Nature's ever willing hand.

The Great Thing

with such planting is the broad fact that the crops are close at hand, and are brought into due rotation, so that often when the weather is not such as will entice the bees to distant crops, they will simply roam on fields almost adjoining the apiary.

The Best Crops for Honey

will be our first great consideration, while at least two-thirds of the area sown shall be utilised for hay, and sometimes as pasturage.

The Earliest Field Crop (Plot No. 1)

is the yellow hop clover, but if sown alone, nothing will follow on the same ground after the June cutting. This starts with apple bloom and flowers continuously from early May until June, and the bees may have the benefit of the bulk of blossom before cutting. It makes sound feed and heavy crops of hay, and will at times realise about twice the value set out in my estimates.

But this miniature clover must be sown with Alsike and Dutch in August or September, and then after the June

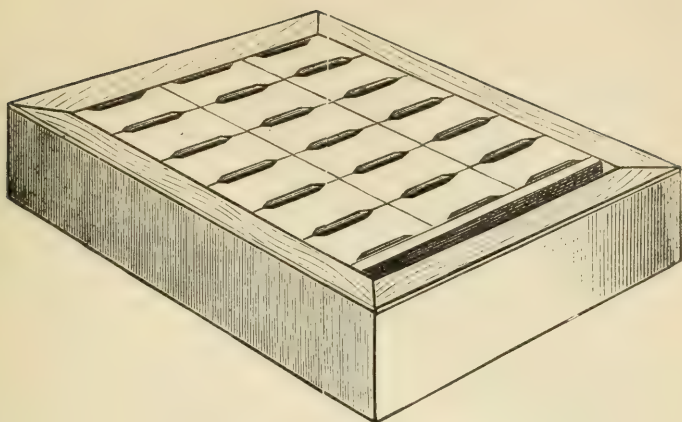


FIG. 6.
Commercial Super.

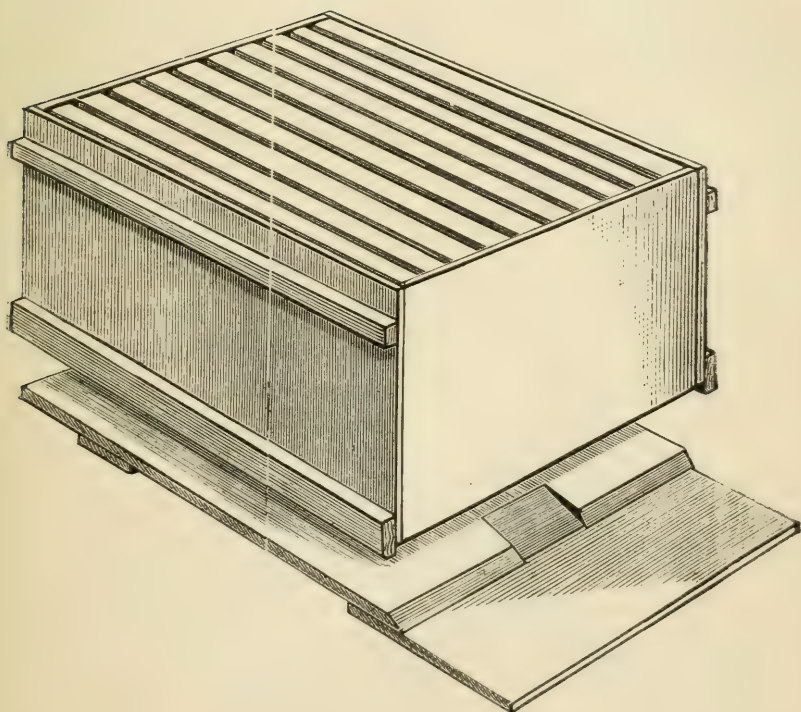
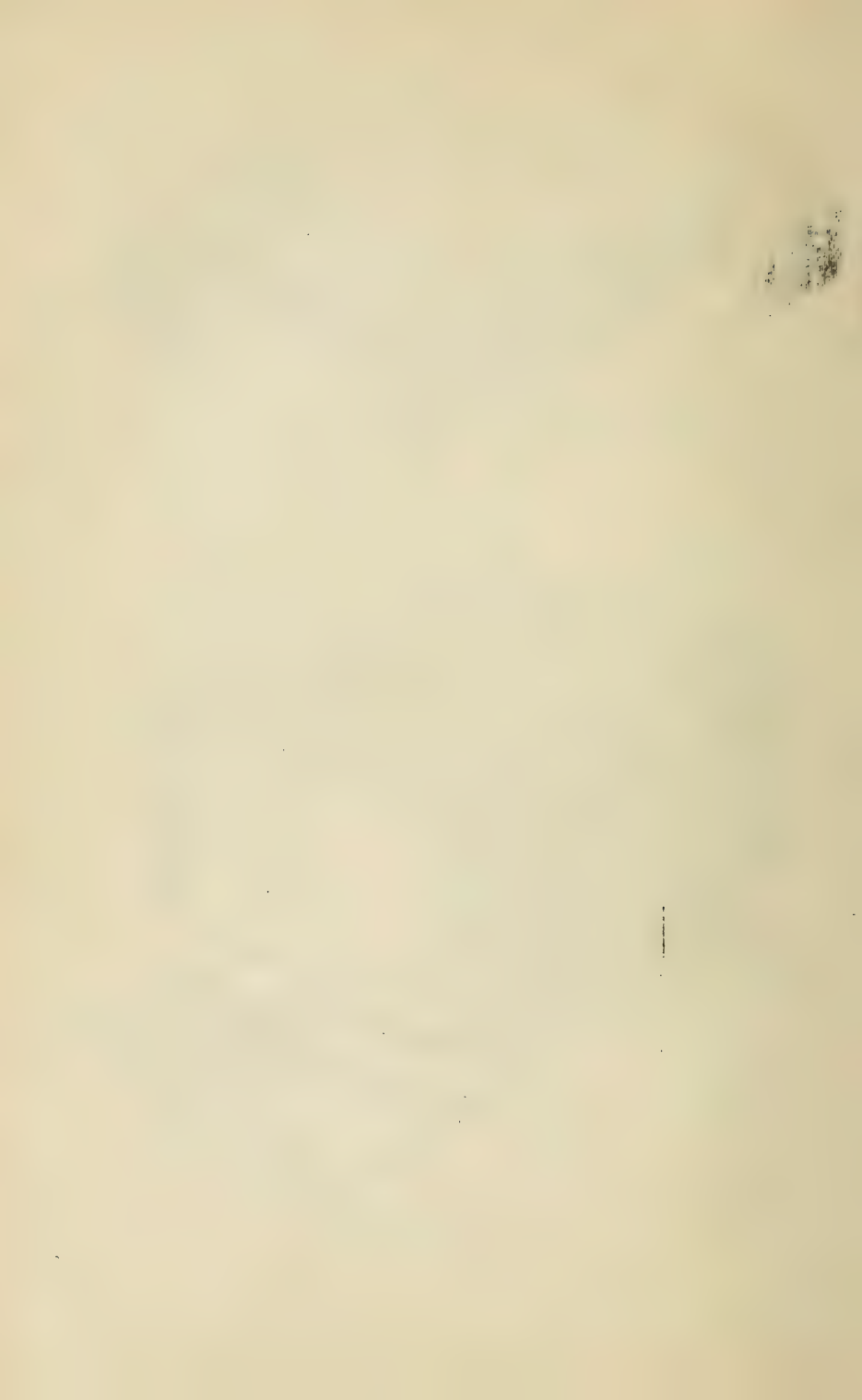


FIG. 7.
The Commercial Hive.



cutting we get Alsike and white to follow—making nearly three months on the same ground, cutting the second time (Alsike and white only) early in August, giving probably three tons in all per acre, as against the one ton estimate. Alsike and white would follow for several years if the ground is generously treated. That is one plot of 20 acres, and now for

Plot No. 2.

The intermediate early crop will be the *Trifolium incarnatum*, flowering from the month of May until mid-June. Now if this is left for the bees it will not make the best of hay, so we will sow it in September with Melilot or sweet clover. We will then cut our *Trifolium* early in June, together with the not yet flowering Melilot, leaving the latter to flower from July until frost.

Now if the Melilot is cut when in full bloom, there is nothing to follow, and No. 2 plot is again empty, but before deciding upon this course we will consider

An Alternative.

As both the *Trifolium* and Melilot flower once and then die away, after the first cutting the Melilot may be allowed to stand and re-seed the ground as the seed ripens and falls. The stalks will then only do for litter.

The *Trifolium* may be sown again each Autumn, the seed being very cheap, and the plant readily established if sown in a showery time, not later than September 15th, and then simply harrowed in and rolled well.

On the other hand no cutting need be made on plot No. 2, leaving the *Trifolium* to re-seed itself, while not being cut the Melilot will flower earlier and the plants be very much stronger. They will, however, not continue flowering so late.

I should prefer to cut the first crop, unless, indeed, I had two similar plots, cutting one and not the other, so ensuring a better succession of the two most valuable of all honey plants.

Plot No. 3.

And what shall we do with this? This will be wholly white clover, and if cut three times in the year on very good ground, or say twice on the average, a very good succession will be got; but not a very heavy crop of hay, unless rye-grass be sown with it.

Plot. No. 4.

This also shall be white clover, and is to be cut a fortnight after plot No. 3, on each occasion. There will then be an abundance of snowy white blossom, from the time the plant first bursts into fruitfulness until far into August.

Plot No. 5.

Now it must be remembered that very few cultivated plants will yield honey after the month of August is nearing its end, no matter how fair the weather may be. Consequently I must return to Melilot as being almost the only profitable bee-plant that will continue to yield honey far into the Autumn. This plot should be pastured a month later than plot No. 2, or if not so utilised, then cut a fortnight later only, as the plant will take longer to recover from cutting than if it had been fed off.

Other Crops.

There are some other plants which have been regarded as very good for bees, and though they have no value for hay, it might be worth while to give them a trial. Thus we have mustard, which may be sown six to eight weeks before needed for flowering; but mustard for Autumn,

like rape for the following Spring, should not be sown later than July.

Mustard is useful for sheep feeding, or for cleaning the ground and ploughing under when just in bloom. Rape is also used for folding sheep and then ploughed under; while as a feed for cows, cut as required daily, it is an invaluable producer of milk; and if cut during the Autumn, will shoot out and flower freely in Spring.

Poor Lands

can frequently be restored without ploughing at all. I had a very inferior field, and during a wet season in July had it heavily manured. After the manure was spread over the ground I sowed a mixture of clover seeds. The whole was then simply dredged with a heavy bush, and in a few days the clover was sprouting thickly over the ground. The new growth had all the nourishment required, and the following year I cut nearly three tons of valuable hay to the acre, where formerly it was not worth cutting. In such cases seeds sown without manure would only be wasted.

Area required for 100 Colonies.

Each square mile of 640 acres, it may be computed, will support 50 colonies of bees, if we consider the average irregular supply; but though this would give the bees only half-a-mile to fly each way, from a given centre, I hope to show presently that a much smaller area devoted exclusively to bee-forage, will support double that number of colonies in full profit.

During the season a fair colony requires for its support during six months of actual work—while feeding large patches of uncapped brood, in feeding thousands of young bees before they are able to work, in sustaining the wear

and wear consequent upon the constant activity of the adult bees themselves, wax-working, etc.—something like 10lbs. weight of honey, or its equivalent, weekly; or some 200lbs. actually consumed during the several busiest months. Add to this, 30lbs. left as winter store, and 70lbs. as a surplus, all items being really under-estimated, we have then the large total of 300lbs. required by each populous hive. For 50 colonies this would amount to 15,000lbs., or over six tons of honey.

The surplus would be put at 3,500lbs. in the above case, but, dear reader, there is another way to look at this matter. The correct practice would be that of uniting two stocks into one at the commencement of the honey flow. This brings in a larger surplus, with a smaller consumption of valuable stores for the total number of bees cultivated. Thus the balance of available produce would be at the rate of three times 70lbs. to each of the united 25 hives; *i.e.* 200lbs., or 5,000lbs. instead of 3,500lbs. from 50; with a consumption in balancing wear and tear, etc., one-third less, or say 130lbs. to each of 25 hives, in place of 200lbs. to each of 50, an enormous economy in valuable material, and one which fully accounts for the larger yield given by the smaller number of more populous stocks.

These doubled colonies, moreover, will seldom require further feeding, as the single colonies certainly do in most cases, and thus a further saving, not enumerated above, is effected.

How can 640 acres produce 15,000lbs.

of honey, more or less, according to management in one season? We will consider that one acre of flowering plants yields an average of 5lbs. of honey daily, and if allowing only 100 acres to yield honey, this brings it out

at 500lbs. for each good honey day ; while out of the six months of the working season, in allowing only 30 days as good for honey gathering, we have then 500lbs multiplied by 30, giving the total of 15,000lbs for the season.

It may be safely considered that these averages are very low indeed, and it may well be said, "What then becomes of all this valuable food, so liberally provided by the hand of Nature, seeing it is so very seldom any apiary yields a surplus anything like approaching these figures?"

It can only be that this gratuitous secretion of the flowery lovers of our tiny workers is lost by mismanagement in many instances. Stocks are not strong when they should be ; the right kind of bees may not be cultivated ; while lastly, too many colonies are often placed in one locality, when, indeed, the whole number are little more than useless consumers.

In many localities, therefore, it may be considered as a great point in management that 50 really sound colonies are all-sufficient for securing the highest results, and these for the time being should again be reduced at the right time, when the very best returns are anticipated.

But why confine an apiary to one square mile ? Of course the bees from a given spot will cover a wider radius, but there are other bees, probably, in the neighbourhood, and it will in any case always be safer to keep well within the range of possibility, rather than extend our desires towards improbabilities. To sum up, therefore, it is not wise to exceed fifty stocks where honey alone is to be worked for, unless the apiarist is certain he has an exceptional locality, or has the land and ability that will enable him to supplement his local resources.

It should be remembered that the honey is obtained at no expense to the crop of hay, unless the same be allowed

to stand too long before being mown. Even for the sake of the bees, most crops should not stand until the greater part of the heads die off, as such ripening process destroys the chance of a second crop. As a rule, those

Plants should be Grown that are Useful for Hay

after the bees have had their gathering. There is only one kind that I can recommend for bees which is unsuitable for cattle, and that is Borage. There may be many others that give much honey, but there is this about them—they require constant care and attention to keep the ground clean, therefore for honey alone such plants are quite out of the question. Borage, however, can take care of itself; outgrows everything else, yields the best of honey, and requires only that the ground be turned or ploughed, in the case of Borage every winter. This plant comes best with the ground turned up roughly and needs no further care; Melilot (*Melilotus Alba*) is a most valuable honey plant, and when seeding down requires that the earth be harrowed and then rolled as often as possible whenever the surface is dry. Do not neglect to roll again the second year, both before and after the leaf begins to show. The omission of this very important matter is why the crop fails with many. We are sometimes told that this plant does well on poor ground; I have had it on both that and rich land with the advantage of three to one in favour of the latter.

For a Succession,

the following will be found most serviceable. Italian crimson clover (*Trifolium incarnatum*) is an excellent honey plant used for early greenmeat, flowering generally in May, but can be sown to give a good succession. White or Dutch clover would follow at 15th of June till first week in July. Alsike cut for greenmeat just before it would

flower will then, in its second growth, follow white, which will keep up the succession till Melilot is in full flower at the end of July, the latter remaining in bloom as late as desirable.

Trifolium Incarnatum,

to give the best results for honey-production, should be sown with Melilotus Alba in August or September. The following Spring will see a grand supply for the bees, the crimson clover flowering from May to June, when the crop should be cut. The Melilot will soon follow and keep the bees busy for several weeks. This second crop can be allowed to stand and re-seed the ground, if a yearly crop following is required.

Trifolium Incarnatum has of late years been highly extolled by American bee-keepers who seem only recently to have discovered its value, though a correspondent writing to the "American Bee Journal" of October, 1895, says he has been most successful with it, and considers it one of the most valuable crops that can be grown. The following advantages are claimed for it by the same writer:—

"It grows in the winter, and prevents the land washing. It yields more abundantly than common red clover, a kind of forage which horses and cattle prefer to almost any other. According to the report of the Experiment Stations its nutritive value is of the highest. I know that my horses keep in the best condition on it. It never causes "slobbering," as red clover often does. It can be grown on sandy land where red clover will not thrive. But its greatest value is as a fertilizer, and as such is the best and cheapest known. It possesses more highly than any other leguminous plant, the power of conveying to the soil the nitrogen of the atmosphere. Its roots go deeper

into the soil than red clover, and are more numerous. It loosens stiff clay land, which, after a time, becomes as friable as if sand had been mixed with the soil. It has been shown by one of the Experiment Stations that an expenditure of 2.65 dols. on crimson clover as a fertilizer put as much nitrogen into the soil as 15 dols. worth of nitrogen purchased in commercial fertilizers."

Every bee-keeper should bring the advantages to be derived from the growing of this clover before the notice of his farming neighbours. It will benefit them, and at the same time help largely to make his own success assured.

Melilot Clover.

In my own trials with this clover on several acres, the sowing was made in April, followed by a very dry summer. It soon rooted, however, and threw out strong shoots which showed green all through the dry weather, supplying a never failing source of feed for the cows, while old-established meadows were almost bare. The following year it was mown in July, and together with the rye-grass sown with it, afforded a very heavy crop. The plant was rather coarse, and the haying time very wet, but after it had been down some seven or eight days, just three hot days enabled me to get it dried and stacked. Notwithstanding the succulent nature of the plant and the wetting it had experienced, the hay came out as brown as a berry, and exceedingly sweet, though, of course, there was no bloom at the time of cutting.

The second crop was all that could be desired as a plant for hay, but being late and rather too thin, the cows again had the benefit of it, as soon as the blossoms were of no further use to the bees. The plant is useful for improving the land, and even if not ploughed under, the great roots rotting after the second year, and opening up the soil to

a great depth, must be of vast service to following crops, as I have certainly found to be the case with this particular field.

At the Illinois State Bee-keepers' Convention held at Chicago, January 9th, 1896, Mr. Baldrige read a very interesting letter he had received from a farmer in Mississippi, who had grown 100 acres of sweet clover for pasturage of cattle and for hay. He had at the time 150 tons of sweet clover hay, and found that both his horses and cattle eat it as readily as that from the red variety. The same farmer said : " I have kept, this season 55 head of stock on 50 acres of sweet clover as pasturage, and besides I have cut and saved from it 50 tons of hay. My stock had all the pasture from the sweet clover they could eat, and they are now very sleek and fat. The plant makes such a rapid growth that the stock and mowing-machine could not keep it back. Of course, if I were to go into the field and cut the sweet clover all down at once, I might then use it up, but I simply cut small plots at a time, so as to let the stock graze all the time. . . . The first year's growth of sweet clover is the finest grazing-plant to fatten stock of any kind, that I ever saw, and especially late in the fall, when all other plants are gone."

The Queen of Forage Plants

is undoubtedly Lucerne ; and in many of the great plains of America it is known to yield tons of honey under irrigation systems ; but in this country, no matter how it is treated, nor how fine the weather may be, bees rarely visit it, and then only in late Autumn in very small numbers, when most other plants have ceased to yield. This is unfortunate, as there is no forage plant which grows so luxuriantly, or recovers from cutting so quickly as lucerne ; it may also remain on the same ground for

many years in succession, but we must have the truth, and therefore I say, and say it regretfully, that the plant is useless for honey.

Late Forage Undesirable.

While we can hardly plant anything that will come in too early, it must be distinctly understood that nothing should entice the bees to work later than September in England. Bees need at least six weeks to regain lost numbers after winter is past. They require just as much time to settle down quietly before the cold season comes on.

Cultivation.

It will be understood that most of the above clover crops, etc., are sown over corn in the spring; the plant being well established by the time the same is harvested, and having the ground all to itself the second year. As to manure, it should be remembered that what is worth doing at all is worth doing well. Wood ashes are probably the best dressing for clovers, but as these cannot be got in sufficient quantity the most economic substitute will be Basic Slag. Among other manures may be mentioned Sulphate of Potash, $\frac{1}{2}$ cwt. to 1 cwt. per acre, and the Patent "Natural" Fertilizer, 5 to 10 cwt. per acre. It is a fact beyond dispute that a dressing of light manure at the rate of 5 cwt. per acre will be more profitable than 2 cwt.; 8 cwt. than 5 cwt.; or 10 cwt. more so than 8 cwt. That is, the heavier dressing will give a much larger proportionate increase and profitable returns; but, of course, this does not refer to concentrated potash and nitrates, of which $\frac{1}{2}$ cwt. to 1 cwt. are sufficient. It should not for one moment be forgotten that "light manures" encourage clover development, while heavy manures smother it, and produce rank grasses.

Sanfoin is an excellent plant on chalk soils, giving two crops yearly, as also will several of the clovers if treated liberally. The former is allowed to remain from two to ten or twelve years, according to the nature or cleanliness of the ground; when brought under cultivation, a second sowing will be of no avail until after a period of fourteen years. Red clover (*Trifolium pratense*) is nearly always ploughed in after the one full season's growth, and does not follow on the same ground again until after a term of seven years. Yellow trefoil or hop clover, should be mixed with clover and sanfoin to make a good first crop. After the first mowing the trefoil does not again appear, but the main crop then branches out and fully covers the ground.

I have found that for all small seeds such as clovers, the ground should be finely pulverised and rolled before the seed is sown. Do not rake or harrow after it is in, but use the roller again and again, when the ground is dry. In too many instances the farmer gets a thin stand of clover, and then blames the soil rather than his own practice of setting the seeds so low that only a small proportion of them germinate.

Whatever may have been said in the past, it must be distinctly understood that Red Clover (*Trifolium pratense*) is *not* a reliable bee plant. I have had considerable honey from it when the weather has been just right, following a dry time for the growth of the second crop, but should the plant have a favourable season for full and coarse development, the bees do nothing upon it however fine the weather may be. A crop yielding only one year in four cannot be recommended.

When growing plants for honey which have no further use, one must make the most of the land under cultiva-

tion. To permit the ground to be occupied by a single variety taking two years to arrive at maturity is sheer folly: and even with those flowering yearly something else must be growing at the same time. The white clover is particularly partial to road grit, and where the sidings, etc., can be secured, they will be found the most valuable fertilizer that can be obtained for the crop; often inducing a heavy growth where the plant was seldom seen previously. A great advantage to be gained from continuous bloom is that the surplus may be removed at any time without exciting the bees to rob, as is too frequently the case when the later harvest is taken at a time when they have nothing more to keep them employed.

Systematic Planting makes Profits Certain.

This branch of apiculture has been much neglected, but bee-keeping as a profession can only become a certainty in this country where systematic planting is carried out. Indeed, even in America the same statement would apply to most districts, as there is a frequent occurrence of poor honey seasons, whereas with heavy crops close at home it could be so arranged that a good surplus would be obtained *every* year, though with scattered crops it sometimes happens that the bees store little or nothing.

In this country it is almost useless for any bee-keeper to attempt to get a living from honey-production unless he can afford to farm sufficient land to materially assist his apiary. In that case he should at least clear his rent by his hay-crops, so that he will have the entire produce in honey as clear profit, while the proceeds of the necessary farm stock will pay his labour bill.

No one has done so much in America to encourage the



from a Photo

PARTIAL VIEW OF THE AUTHOR'S QUEEN-REARING APIARY.

(by Mr. Claude Fiecht.)

planting of bee-forage near the apiary as the late Mr. T. G. Newman, when editor of the *American Bee Journal*. He not only recommended it as being an advantage, but has always *insisted* that it is *absolutely necessary*, and one of the first duties the bee-keeper owes himself. I quote the following from Mr. Newman's *Bees and Honey*:—"In view of the uncertainty of nature providing sufficient continuous bloom, and the certainty of annually recurring periods of cold weather, and long hazardous confinement, the bee-keeper, to ensure success, should as conscientiously provide pasture from which his bees can gather food, as to provide hives with which to shelter them from the storms. *With a liberal allowance of good, wholesome honey in the fall, the first requirement for successful wintering will be provided.*"

Observe the last sentence; what a world of meaning the words convey to those American and other bee keepers who so often lose heavily during winter! Our cousins across the water put their losses down to bacteria, pollen, cold, etc.; but their late-gathered honey is not always good and wholesome, while in many cases, if it is good, it is gathered often so late as October. Thus the vitality of the bees is undermined too late for recuperation by breeding before the cold of winter is upon them. Nothing is so exhaustive as the gathering and storage of a heavy surplus, and thus the too late gathering places a colony at a tremendous discount for wintering.

A letter from a practical farmer, and my reply thereto, will be of interest to the reader. "I am," he says, "very interested in the Chapter on Planting, and . . . have seriously thought of working my farm to suit planting for bees. How would it do to arrange a succession, having 75 acres under clover, and 75 with corn and roots, *i.e.*, three years clover and three years corn, etc.; or would

the ground eventually get sick of the clover, having it so often. Do all four clovers named for a succession (scarlet, white, alsike and melilot) give two flowering crops yearly; or do you count on one crop only from scarlet, alsike and melilot. If they all flower twice, what would be the dates for first and second crops."

"You will find," I replied, "150 acres give you sufficient as a succession for the bees, having as you say only 20 stocks, and not desiring increase, representing, say, the power of 50 ordinary swarmed lots.

"As to 'clover sick' land, I do not think you will find land clover sick, except with the common red. I have tried a field where the former occupier could not get a plant of red clover. The first time I sowed scarlet or *Trifolium Incarnatum*, and got a good plant. The next year I sowed Melilot, and that also came very thick."

"The dressing for the *Trifolium* was 4 cwt. Basic Slag to the acre. The Melilot was sown (following year) with rye-grass, the land having first been dressed with 30 tons of yard manure, ploughed in, with 4 cwt. of bone dust, and 4 cwt. of salt to the acre, before harrowing in the seed.

"The worst of it is from a bee-keeper's point of view, one cannot do without red clover, if he wants a down-right farm-crop, supposing the land is not clover sick. Alsike is late in flowering, and practically flowers only once in the season, and that in July, being a much slighter crop than red. White clover flowers in June and July, and then again immediately the crop is out. *Trifolium* flowers only once—May and June, and dies away the same year. Moreover, it makes inferior hay, even dangerous to animals, if cut after the seed forms. It is essentially a green crop, and a most valuable one, when fed as such.

"Melilot flowers only once—August till frost, and is

very valuable for honey where a large area is sown. It has the desirable quality of enriching the soil with nitrogen to a very large extent. Its immense roots penetrate to a great depth, and in decomposing, also assist the productiveness of the soil for future crops.

"No matter how dry the weather may be the crop is always sure, and always green, and will supply pasturage, or a crop of hay, when everything else is dried up. Nevertheless it has one great drawback, for when the first crop is cut for hay in June, many of the stalks are too coarse for any animal to consume. This difficulty is avoided by feeding off until July 1st, when the following (flowering) crop will come finer, and be one mass of bloom. During the second year after sowing, it may also be cut in May, and then fed off for a few weeks before saving the second growth, as this will avoid the coarse stalks.

"I find it should be sown with Trefoil, and Red, or Alsike clovers, as well as with Rye-grass, for obtaining the best results in hay; cutting at the end of May, and again in August if with Alsike, or a little later if with Red clover. Melilot should not be sown with corn, but the field may be fed off to great advantage while the plant is stocking out during the first year.

"White clover is a permanent plant, Alsike and Red last only so long as the ground keeps clean, and that may be three or four years, though the red is generally ploughed under after one full season's crops."

Alsike Clover

is certainly to be preferred to Red, from the Apiarist's point of view, and though giving only one hay crop yearly, every piece of it is sound feed, whereas much of the stalky red clover is discarded by stock. Its value for milch cows is shown by the following, taken from *Gleanings*

for March, 1885, page 161 :—"As a forage-plant it has no superior, producing a large flow of very rich milk. June 15th, when I shut the stock out of the Alsike, I allowed them to run in a field of red clover that was just coming into blossom, and at the end of the third day the five cows had shrunk their milk to the amount of 9 quarts to the milking. Again in October, to test it further for feed, as there was quite a growth of leaves on the ground, I again allowed the cows in the field. You may judge of my surprise, when I found, at the end of a week, they had made a gain of 10 quarts to the milking.

Does Artificial Pasturage Pay?

A remarkable letter appeared in "Gleanings in Bee-Culture" for July 15th, 1902, from Dr. Gandy, who appears to have made a financial success of planting for bees. He says: "I give herewith some ideas obtained during my 30 years' experience as a bee-keeper, the last 17 of which I have handled them as a commercial pursuit, keeping during this time from 500 to 3,000 colonies, 100 of them being in my home apiary. . . . I claim by my method of handling, of which I can describe only some of the principal features, bees can be made to produce double the ordinary surplus and perhaps more. I assume that the reader is a bee-keeper who has plenty of nectar-secreting plants in his neighbourhood, as any section can be made a good place for bees at an expense of 60 dols. for catnip and sweet clover seed, and this sum is less than the profit I derived from a single colony last year. Much of this increase is attributable to the plants; but I am confident that my particular methods helped largely to bring about the greater yield.

"When I started bee-keeping on a large scale my neighbour bee-keepers did not average a surplus yield of

over 50 lbs. per year to the colony. I immediately set about improving the bee-pasture, and my average yield of surplus for 11 years was 150 lbs. to the colony, and for the last six years it has been 300 lbs.

"My increase has always paid all expenses, including 10 per cent. interest on the investment. I produce chunk, extracted, and section honey, and sell all at 15 cents. per lb. in this and neighbouring towns. My net profit for 11 years was a little over 400 per cent., and for the last six years it was a little over 800 per cent. Last year my home apiary, of which I am now writing, 75 colonies (spring count), gave me 407 lbs. to the colony. . . ."





CHAPTER VII.

THE AGRICULTURIST AND FRUIT GROWER.

“GOING BACK TO THE LAND.”

THE value of crops suitable for bee-forage has been shown by the preceding chapter. The bee-keeper who is also a farmer therefore has every advantage and can make profit in several ways. But while it is necessary that the extensive bee-keeper should also be a farmer, it is quite as important that the agriculturist should keep a few stocks for the sole purpose of fertilising the clover, turnip, rape, and other crops he may save for seed, if it happens that few bees are cultivated in his neighbourhood.

It should be distinctly understood that the more bees that can be obtained as fertilising agents, the more seed will be perfected, as well as more fruit. Single hives have been placed in cucumber and peach houses, and though some bees are of course lost in the first instance, the younger portion of the population never having flown outside, have no difficulty in finding their way about. The results have been reported to be most satisfactory, and the plan should be more extensively adopted.

Strange as it may appear to those who are inclined to

“Coming events cast their shadows before.”

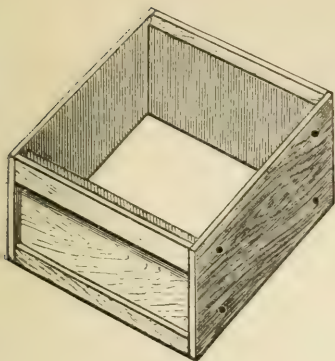


FIG. 01.
Extracting Chamber.

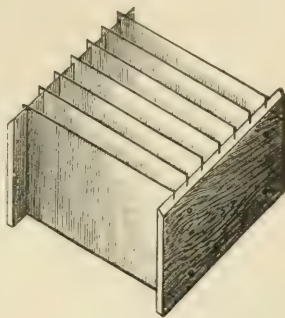


FIG. 02.
Dividers for inserting in same.

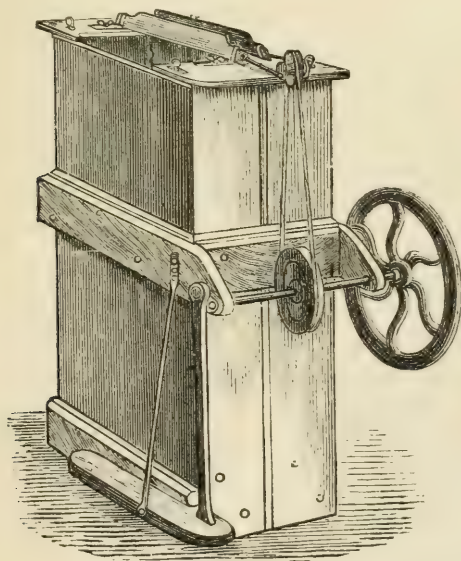


FIG. 03.
The Author's Original Uncapping Apparatus.

The above illustrations are re printed from the original blocks used in
Simmins' Non-Swarming Pamphlet, 1886.

grumble at the visits of the bees to their fields or gardens, it is a simple matter of fact that if the honey be not gathered it will only evaporate, and none is secreted after the flower begins to fade.

Fruit growers often complain that the bees damage their fruit crops, and in autumn, when there is nothing else to be obtained, because they see a few bees among the wasps and flies, the former get all the blame ; whereas they have never been known to break through the skin of sound ripe fruit, but simply lick off the moisture that may be present where birds, wasps or other insects have first made an inroad.

A Disagreeable Feature

in connection with bee-keeping, when carried out near towns, is that the bees will persist in visiting the fruiterer's stalls. The proprietors have of course every right to defend themselves from what, to them, is a perfect plague, as they dare not expose anything sweet, or fruits with the least sign of broken skins during the autumn. Frequently the bees outnumber wasps by hundreds until the fruit is black with them, and where possibly a wasp only makes a beginning, the bees soon make a finish. Thousands of these innocent pilferers are trapped and destroyed like common wasps and flies, and no doubt in many instances the owners of the bees see their colonies dwindling down to sheer uselessness, while helplessly looking on. One cannot persuade the fruit-seller to put all his wares under glass, and the usual netting is of little avail. So die the bees must, unless the apiarist takes active means to prevent these dishonest visits. If he does not, he not only deserves to suffer, but has no right to keep bees that are a nuisance to his neighbour.

Possibly in the case of breweries, or jam factories, the

owners, for their own protection and profit might be persuaded to cover their windows, etc., with woven wire; but nevertheless there is just one way whereby the bee-keeper can avoid all this trouble and loss of bee-life. Let him

“ Feed Solid ”

as soon as he finds no more honey is to be gathered, and therefore immediately he can remove the surplus. Bees with their combs solid with sealed stores, will have no reason to search for injurious sweets. They will sit quiet, and not even trouble to rob during that period when half-fed or starved stocks are ever on the alert. The owner will not only save his bees, while doing his duty to his neighbours, but will have his stock in the best possible condition for wintering, and rapid progress thereafter.

Fruit Culture

for the purpose of jam making is now making such rapid headway in this country, that all growers should have the subject of bee-culture brought very forcibly before their notice. The presence of a few hives in the immediate vicinity of fruit gardens and orchards is not simply a benefit to the grower, but is a matter of the first importance; and those who wish to secure the nearest approach to constantly recurring profitable crops, will find it an absolute necessity to encourage the presence of the domesticated honey bee. In some instances at least, particularly with farm crops, there is simply the loss of seed where the flowers had escaped fertilisation, but in far too many cases where the blossom is not fully fertilised by the agency of the bees, the fruit is not only imperfectly developed but in many places does not develop at all. In my own experience, which is also substantiated by other similar reports, it has been re-

markable to find in my own garden a full, and sometimes an abundant crop of fruit, while the general reports have told of failure and scarcity.

In a neighbourhood where many bees are cultivated, and more particularly in the garden they may occupy, it is very rarely, indeed, a poor crop of fruit is found, simply because the bloom is so thoroughly and regularly fertilised by the action of the bees, in securing a constant transmission, and mingling of the pollen.

The failure of the fruit crops has repeatedly been put down to the devastating action of various moths, and other possible and impossible causes ; but while the ruin thus created is sometimes apparent, the absence of suitable insect fertilisers is a deplorably frequent and only too noticeable occurrence.

It is plainly evident that the fruit grower of the future who attempts to conduct his business without taking every means to secure the aid of the industrious honey bee will be like a captain attempting to carry his ship through the sea without a rudder. More or less success has of course been obtained in the culture of fruit in the past ; but the growers have not hitherto had their eyes fully opened, that they could tell why the greater success, or the least profitable result, and even loss, should occur. The proximity of a larger or smaller number of hives will generally be found to sufficiently explain the variations. The state of the weather, and all supposed enemies of the fruit gardens, will receive far less consideration when the foregoing remarks are fully appreciated and acted upon. A single hive, or even a dozen, will be of little use where there are large gardens and orchards. From twenty-five to one hundred stocks will be needed to secure the best possible results, according to the extent of the fruit farm ; and even if no one on the premises

understands the management of bees, after defraying the expense of employing an expert either occasionally, or permanently where the number nears one hundred, there will be a considerable profit on an apiary so favourably situated, while the immense benefit conferred upon the fruit crops will be entirely gratuitous.

Any neighbouring bee-keeper should be encouraged, and in many cases expense may be saved by arranging with such apiarist to place a few of his hives in some sheltered spot on the premises, where the bees will be close at hand during the critical period of fruit bloom.

The Author's Orchard

consists of some four acres, with standard Bramley's Seedlings, set out at twenty-seven feet apart. Between these again are dwarf trees grafted on Paradise stock; the varieties being limited to Cox's Orange Pippin, Bismark, and one or two others. In new orchard planting the great object is the production of large quantities of apples or pears in limited variety, each variety being carefully selected, and separated. These require little or no expensive labour in gathering, but in growing small fruits, much hired labour is necessary, while the marketing is often a risky business.

Bee-Keeping Alone.

I have had many applications from those who would leave their present occupation, so that they may keep bees only, as a source of income. There could be no greater mistake in this country, than for an inexperienced man to set aside everything and go in for honey-producing only. If he wants to go into the country, he must have land; then if he has land he must have stock; and in a small way his stock should be principally good milk-

ing cows. Consequently when he has land and stock, he will also be a producer of hay, and now we begin to see how a man, pining after a freer and healthy outdoor life, may support his family, if not in affluence, then, at least, in comfort.

£300 a Year from 30 Acres.

Having extended the title of this work, I am under an obligation to my readers to substantiate the above statement. Of course, if anyone wishes to see this realised in his own case, he must be a man with a certain amount of capital, and be prepared to spend a year or so on a suitable farm where he can see how the routine is carried out day by day. But if one has little or no capital, he must, of course, be content to start from little beginnings, and work up gradually upon the rules herein laid down, when if he has sufficient energy and "grit" to push on over every obstacle, he will ultimately come face to face with his £300 per annum from 30 acres.

Profit From the Land

we are told, is something belonging to the past. But it is only the grumblers, the shiftless, and those who cannot or will not change with the times, who tell us this tale. Until quite recently the holder of a 300 acre farm was clearing £1,000 per annum from ordinary farming. Another well-to-do farmer having good grazing ground, made better by being constantly stocked, recently told me he would buy in a lot of two-year-old bullocks, and within a few months always sold them fattened at a clear profit of £5 per head.

Then just profit by the case of an old gentleman, who in that wonderfully dry year of 1893 had on hand seventeen hay stacks, each representing the proceeds of a different year; and all sold at £10 per ton. Now if each

stack amounted to only 10 tons, what a nice little sum, £1,700 quietly accumulating, during all those years. But, of course, the farmer will not always be so fortunate as this, but why should he sell for £2 or £3, when hay, sooner or later goes up to £5 or £6 per ton? At these figures it should be held no longer, for it does not do to be too certain about such prices continuing; as instance another farmer in 1893 was offered £10 per ton for 50 tons; but no, he must have ten guineas; when lo! by the following Spring the value went down rapidly to less than half. Now to return to

Our 30 Acres of Grass Land.

Of these, twenty acres should be laid off for hay, leaving eight or nine for pasturing the stock; the balance being occupied by the house, farm buildings, gardens, etc. After the land is worked up into a condition of settled stability, by the use of farm-yard manure, by pasturing cattle, the keeping of poultry, the judicious use of artificial manures, and re-seeding if and when required, the occupier will have a bank at his own back-door, such as few other investments can offer; as when land is once brought into a state of great fertility, the cost of keeping it so is comparatively little. If you have not in the first place the means to bring it rapidly to this condition, then as before stated, it will be a matter of years in the doing.

Very well, at this stage, at a moderate estimate, the twenty acres will produce

Thirty Tons of Hay Yearly,

30 tons at five pounds per ton will yield £150, and there is no reason why you should sell until it *does* reach £5, if you have a reasonable amount of capital.

Cows and Growing Stock.

The remaining 8 acres, after excluding other plots and a large garden, should be worth £10 per acre as pasture for cows in milk, and young growing stock, for the open season, say from February to September; this being equal to £80. I will now show how this is understating the facts. A four-acre field which would hardly yield one-half-ton of hay per acre when I took to my farm, has lately yielded £2 a week in milk and butter for seven months from two cows and one heifer; besides supporting for that period two other heifers, thereafter coming into profit; a total of £56 from the four acres. But these were Jersey cows, and good Jeyseys at that, such as *average* 10lbs. of butter weekly during the whole period they are in profit. It costs no more food or attention to keep good stock than is required for poor profitless animals; then why should a man bother himself with sheer rubbish on which he is losing money daily?

Folding Fowls on the Land

just as you would a flock of sheep, is something which many people are not acquainted with, and which our old-style farmers do not understand, and it is doubtful if they would take the trouble to do it. Well, this is how fowls can be made to pay to-day, in large pens which are shifted two or three times a week regularly and evenly over the land; so that where formerly half-a-ton of hay was secured, two tons and more is now the yield. Even in this district wherefrom a hundred tons of dead fattened fowls are sent up from one station weekly, the author is probably the only breeder who thus shifts his chickens over the land in movable pens. A thirty acre farm may easily carry

100 Breeding Hens,

besides the thousand or two chickens reared therefrom during the season, and the profit from each hen is usually found to be £1 for the year, in eggs and chickens produced. Here we have another £100 after paying all expenses. Consequently we are still left with the most important and the most profitable department of culture upon the farm, that of the bees; and yet these require less labour and attention, and far less feeding than any other stock upon the place, when once the hives are well established.

They will show larger and more valuable returns than the cows, or the hay, and yet I will place the profits so low that the greatest grumbler will not be able to find fault with this, the modest sum of £1 per hive for 50 colonies of bees, standing upon less than one-fourth of an acre. But then you see they take toll from your neighbours' acres, from woodland and forest, his open pastures, gardens and orchards, and his waving fields of clover, with dancing heads bright with many attractive colours. And above all no rent is paid for this innocent trespass, and no harm is done to the owner, for the busy bees take what he can never harvest, and that which he hath not cannot from him be robbed.

The Total.

Now what do our figures show :—

	£	s.	d.
30 tons of hay at £5—£150 (less all expenses), say	...	100	0 0
8 acres pasture at £10, as profit from dairy say—	...	50	0 0
100 hens (eggs and chickens from), say—	...	100	0 0
50 stocks of bees, yielding £1 each...	...	50	0 0
Profit on horned stock sold annually	...	25	0 0
		<hr/>	
		325	0 0

I have therefore allowed a very large margin upon the expenses of getting in the hay, for carting, and artificial manures, if required ; there is also a second cut from one or other of the fields, to be utilised for home use. On the eight acres of pasture also enough margin is allowed for paying a large part of the rent, or labour ; though an active, healthy man will not require much hired labour on a little grass farm apart from the haying. The 100 hens and the several thousand chickens reared therefrom will leave a very large margin towards rent and other expenses, in the valuable manure left upon the land. Then again the 20 acres after cutting, will in value of pasture alone, make a heavy item towards the rent of the farm.

When I state that in apiaries worked for honey the stocks will often average 100lbs. per colony, while some colonies of bees have stored up to 300lbs. and more, and my own apiary yields several times the amount shewn, it will be agreed that the profits from a 30 acre farm are not by any means overstated, especially as I have not set anything down as a profit from the young orchard of four acres, which should form part of a 30 acre farm when owned by the occupier.

The proportion of profit from a larger holding will, of course, decrease, because of the greater expenses in labour and other items ; but I am aware that very small holdings when used for market gardening purposes will show much larger returns at times, but there is more expense in labour, and more risks to run.





CHAPTER VIII.

ENEMIES AND DISEASES OF BEES.

IF all colonies are in good condition there is no enemy known in this country that can cause any serious depreciation in the population of our stocks. Birds occasionally take bees, but according to my own observation dead drones and workers are usually eaten, or those which may have become chilled.

Wasps do the same, but are not often able to rob the stores of a hive unless it has a small population. Of the more simple diseases to which bees are subject

Dysentery

is known by the bees soiling their combs and the flight-board with their excrement, being unable to rise on the wing before voiding the same. This occurs in early Spring, just as it is hoped the bees have passed the worst of the Winter. It can generally be prevented by providing that they have plenty of good stores, judicious ventilation, and free passage under the frames (*see* "Wintering"). A cure is to be effected by feeding warm

syrup on the first fine day, thereby also inducing the bees to take a general flight. If the combs are very badly smeared they should be removed and clean substituted.

Dysentery is very readily induced by any exciting cause after the bees have been a long time without a cleansing flight. Thus, a stock, apparently in the best possible condition, may from some quite avoidable occurrence have its entrance choked by dead bees, and then the more prosperous the colony, the more disastrous will be the result.

By far the greater number of cases may be put down as being directly caused by starvation. A small lot of bees unable to reach stores situated away from the cluster, will generally perish without excitement during a too-long spell of cold, the cluster remaining unbroken just as the bees rested upon the combs. But take the case of a strong stock, particularly where a patch or two of brood has been started, and instead of continued cold compelling them to remain and die where they sit upon their combs, their very strength is the cause of their own destruction. They generate too much heat to remain quietly clustering where all the store within reach is at last exhausted. Though too cold yet for individuals to reach the more distant, but still plenteous store, the bees fully aware of their critical position, soon arrive at an excited condition, the temperature goes up rapidly, the cluster expands, and the lately unapproachable stores are within reach. But the instinct of self-preservation does not allow them to count the cost—the tremendous discount thus made upon their vital energies ; neither can they avoid the fouling of their once clean, sweet smelling home.

Should a warm day soon follow this untoward excitement, the after effects are to a certain extent modified, as a good cleansing flight can be taken ; but when the cold

still continues, the bees never again being able to regain their former state of semi-hibernation, drag out their existence wandering aimlessly about, and die at a rapid rate, each day adding to the accumulating filth of the hive.

Prevention.

This form of starvation, with its possible consequences, is to be avoided by seeing that every hive has heavily stored combs of good sealed food to winter on. A stock fed with ten or twelve pounds of thick warm syrup, rapidly, towards the end of September will store such food in the immediate vicinity of the cluster, and will stand well, until the following Spring is warm enough for the bees to move freely about the hive. Dysentery will probably never follow after such a provision has been made, unless through carelessness some other exciting cause, such as a choked entrance, badly fitting roof, etc., is permitted.

Another Item

of considerable importance as a preventive, is the adoption of a large frame, when a greater store of food will always be found within reach of a more compact cluster. In a semi-hibernating condition, during cold weather a cluster of bees has no difficulty in gradually moving along the surface of the same combs, and can do so without there being any reason for excitement, but when it becomes necessary to shift on to an entirely fresh set it means, as we have already seen, a disastrous disturbance of their natural economy.

Foul Brood,

generally so-called, but by my lamented friend, the late F. R. Cheshire, designated *Bacillus Alvei*, is the only really serious disease the bee-keeper has to contend with.

Cheshire conducted many exhaustive experiments, and investigations in regard to this matter, and was certain in his own mind that the disease affects not only the brood, but the adult bees and the queen as well. He also assured me that the disease could not exist in the presence of acids, and though he was able to show a stock completely cured by his own treatment with a solution of carbolic acid ; it would appear by the light of my own after experience, and the numerous failures reported by others who have tried to follow out his treatment, that he was not quite on safe ground, as we shall presently see.

A Revolution

has occurred in the treatment of what may be termed the "bee-disease" ; or rather, I should be more correct in saying that a complete change has taken place in my own methods of subduing it, as also in my opinion as regards its effects upon bee-keeping ; for as a matter of fact any radical change, or revolutionary teaching, though proving undoubtedly correct in application, is seldom accepted by the public as an economic principle for at least a decade after its advent, as instance, several improved methods advocated by me some fifteen to twenty years since, and quite recently brought forward by our American cousins as new and important items in management.

Initial Stages of Disease.

It has so frequently been stated that the disease can be discovered by the foul smell emitted by the stock which may have it, that I consider it necessary to warn the uninitiated not to wait for such a rude awakening. At that stage it is very infectious indeed, and it will be a saving to burn the hive and contents at once. With a colony in such a state the novice is certain to do only

harm by attempting a cure, and with his want of experience, he will do well to be clear of it.

CAUTION !

should be the bee-keeper's watchword, while extreme vigilance will bring its own reward. Now ye, who have never seen foul brood, do be most careful to note that frequently in summer its appearance is to be discovered by irregular or "patchy" slabs of brood, among which there are no black or rotting grubs whatever ; for while the bees are actually storing, every sickly larva is at once removed ; so that when patches of brood known to have been quite compact are presently of irregular ages and appearance, it is time to be strongly suspicious.

Do not by any means wait until the complaint is strongly in evidence, with the unsealed larvæ turning yellow, and then dark brown or black, instead of ever presenting a pearly white appearance, while some of the capped brood is in the same state, with coverings pierced and sunken. Now, here is a distinction to be observed between the genuine foul brood and simple chilled or dead brood. In the former case none of the larvæ dries up to a white cinder, being always rotten and slimy, so that the bees do not, as a rule, remove it from the cells. In the case of

Chilled Brood and Simple Dead Brood,

The former is soon removed by the bees, and should any be overlooked, it dries into a hard lump without changing colour. Simple dead brood resulting without chill, and with no apparent evidence of disease, has in some cells the appearance of the genuine foul brood, but with this the greater part of the nearly mature bees dry up and retain their original form and colour. By this feature alone I have always been able to distinguish the

difference between the two, and have put an end to the more simple affair in all cases by destroying the queen and giving a young and vigorous one to the colony.

Cheshire Cure for Foul Brood.

This remedy is absolute phenol or pure carbolic acid, used in the proportion of 1-400th in the syrup fed to the bees. Cheshire considered that the queen should not be removed; but on the contrary, if it is intended to save the combs, I have found the first step towards a rapid recovery is made by deposing the reigning queen, and giving a young and vigorous queen bred from clean stock, when the entire attitude of the bees is changed, and great determination and energy takes the place of the former utter inability to clear out the foul stuff.

If the disease begins in the early spring and is not noticed, it is very likely the colony will go down at a rapid rate, while the remnant will not be worth troubling with, and should be cleared out by fire after sulphuring the bees. This should be done in the evening when all the other stocks are quiet, taking care to foul as few things as possible; burn all you use that is not of much value, and the rest disinfect thoroughly.

Rational and Simple Cures

for foul brood have been so long known to many practical bee-keepers, that it seems strange there are others quite unable to cope with the disease when it makes its appearance in their apiaries. The cause of this in the first instance must be inexperience, but on the other hand where the inability to cure can not be put down to wilful negligence it is almost certainly through want of *caution*. The disease has been cured in the past, and can be as readily cured to-day. There is really no excuse whatever for the continued existence of foul brood in any

apiary, in the light of facts now being placed before bee-keepers.

Foul Brood a Terror no Longer.

So many bee-keepers have been wrecked upon this hitherto dangerous rock, that my somewhat extensive treatise upon the subject may be excused by my determination to end once and for all, if possible, those endless worries, and constant waste, to which sufferers have been subject.

I have endeavoured to show how the disease, if handled in a rational manner, need have no further terrors either for the amateur or the commercial bee-keeper, and there is therefore no reason why the industry should not be placed upon a firmer basis than hitherto.

The Definite Izal Treatment

followed by those who have experienced the lasting pleasure of seeing their diseased stocks turned into healthy, profitable colonies was recommended by me, as follows :—

(1.) To begin with never spray or sprinkle combs, having large quantities of healthy brood with *any* disinfectant. Place them near the outside and so treat when all living brood has hatched out.

(2.) In commencing to treat any very weak diseased stock (seeing that this treatment obviates any destruction of combs) first of all give the said colony a full comb of hatching brood. If this cannot be done, then burn comb, frames and bees at night, first smothering the bees.

(3.) *Treatment with Izal Solution.* Have a change of hives, and wash out each week (three times will generally suffice) with solution of one tea-spoonful to two quarts of water. At the same time saturate the whole of the quilting by dipping it into a pan of the solution, and if

warm, do not wring it out ; and continue this once a week until satisfied all is well.

(4) *If desired to feed.* Use only half-teaspoonful to 12lb. of sugar made into syrup.

(5.) *The Water Supply.* One teaspoonful of Izal to ten quarts of water.

Foul Brood annihilated by Izal.

Experiments conducted by myself have placed Izal beyond all other applications that can be used for the purpose of curing this disease ; though for some years I have been unable to continue personal experiments, because, fortunately perhaps, the disease cannot exist side by side with the continued use of this germicide, as is my own practice during all manipulations I carry out in the apiary.

Its name, its nature, and its efficiency, should be made known to every struggling bee-keeper, who too often falls under after using the many useless applications he has been told to apply, in the face of repeated failures known to have occurred where such have been tried.

At my recommendation, many bee-keepers have absolutely expelled the disease from their apiaries by the use of Izal. Phenol and many other supposed remedies, hitherto advocated, have been obnoxious to the bees, if not absolutely poisonous both to them and the operator ; whereas Izal is not only harmless, but is decidedly liked by them ; so much so that if the Izal bottle is left exposed, bees will frequently crowd into it, as if it were honey or sugar. This is a very great point gained in the treatment of the dread plague, as syrup to which the remedy has been added, is readily accepted at all times.

I have not space to give all the remarkable cures effected, but one or two will suffice. A working man who

secured 120lbs. of sealed section honey from the Conqueror hive, and some 790lbs. of comb honey in all, from eleven hives during the poor season of 1902, had his bees badly diseased some two or three years previously. He followed my directions implicitly, and to-day is using the same combs in a perfectly healthy state, which at that time were seriously diseased. His recent large yield, consequently, is the more wonderful, and his own graphic statement of the serious difficulties he had to contend with, should be an object lesson to all who are inclined to lose hope when the enemy overtakes them.

Cures by Izal Without Destroying Combs.

This is his narrative. "I shall always feel thankful to you for your kindness in the matter of foul brood. I had a great worry with it, and yet much of that could have been avoided if only my neighbours had all been united in the endeavour to stamp it out. But, no! They each had skeps and bar-frame-hives, and well knew what was the matter with their bees; but they would not go to a little expense and labour to be rid of the disease. So their bees died out, and there they let them stand just as they died, and would neither put their hives away nor destroy them."

What a contrast was here. On one side lethargy, despair, and finally ruin! And the other—energy, determination, ultimate victory! Aye! and more, a double victory, for not only was the disease in his own apiary conquered without destroying the combs, but the terribly ruinous, selfish actions of his neighbours were also overcome by the steady, dogged perseverance of the man who allowed nothing to daunt him.

Dear reader, this is a grand example; and need you ever sit down in despair, when perhaps you have a wider

intelligence, a far higher education than this working cottager; who, however, will always at least be your equal in that set determination to overcome every difficulty.

A bee-keeper of life-long experience writes :—" During the autumn of 1897, I was called in to look at a neighbour's bees (five hives) with a view to purchase, and on entering the garden found them literally stinking with the disease. Opening them one by one I showed this to my friend who readily acquiesced in my doing as I liked in the matter. I then cut a piece of brood comb from the worst lot and enclosing it in a coffee tin, sent to the Editor of the *British Bee Journal* for his opinion, in order that my friend might be satisfied I was not trying to beg his bees. In the following number of that Journal a note or reply was found saying "it was impossible to conceive of a worse case of foul brood." Well to cut a long story short, we destroyed all but this worst lot, and that I removed to an isolated spot for experiments, cut out all brood and left it until February of last year. During a very mild day of that month I peeped at each comb and though breeding was going on, no sign of foul brood was there. Of course Naphthaline was there in quantities *and* something else, and that something else was 'Izal.'

I reported this later to the *British Bee Journal* omitting any mention of Izal, but only received a private letter saying it could not be printed, and asking me to wait till about May or June, then report again. I steadily applied my Izal treatment, and in due course reported the complete cure, and the hive gathering honey splendidly, after having cast a 6lb. swarm.

I had a few other cases brought under my notice during last summer, and in every hive but one, complete cure was the result of a few dressings with the Izal treatment.

These hives, or those of the writer's can be 'interviewed' at any time for the purpose of substantiating what I have said."

Another Report: Izal v. Naphthaline.

"In the year 1897 I found three of my hives were affected. I had never seen Foul Brood, but I suspected what it was by the grubs having a flabby appearance, but I could detect no unpleasant smell. I sent a sample of it to the *British Bee Journal* Office, and the reply was that it was foul brood. The three lots I sulphured, cut the combs from the frames, and burnt them; made mead with the honey and melted the wax and sold it to a local grocer. The hives I scrubbed with hot soda water; finally painted the insides with crude carbolic acid and set them aside; the quilts were also burnt. I placed naphthaline on the floor boards of the other hives; then I thought I was safe. But the following Spring I found every hive I had affected little or much! I did not know what to do with them, and had serious thoughts of burning the whole lot, and starting again with another lot of bees; but I hesitated, as that would be a great loss. Then came under my notice "Foul Brood Annihilated," without destroying bees or combs. I decided to try it, and procured a bottle of Izal; then giving each lot a fresh hive, the inside of which I well soaked with Izal solution as well as the floor boards. The quilts I sprayed pretty freely. I also put a little in the syrup I was feeding with and they took the food alright. I notice too the bees have not such an aversion to Izal as to carbolic acid. A week after I repeated the process and during the third week I had the satisfaction of seeing a decided improvement. A nice lot of healthy larvæ appeared, the bees had removed a quantity of the diseased grubs and the queen had deposited eggs in the vacant cells. I noticed too the bees

seemed more active, my hopes revived, and I began to think after all there was a method of combating the disease without destroying the combs. I continued to change the hives, and used Izal freely at various intervals during the summer. When I packed them up for Winter the combs all looked nice and clean, and as far as I can judge, cured !”

Facts v. Theory.

Theoretical scientists, editors and others, stand aghast at these conclusions which both begin and end in indisputable facts, contrary to all their own preconceived ideas ; but they will not understand the results until they are prepared to admit my own original statement, also born of fact, that micro-organisms are the *result of*, and not the primary origin of disease.

There are not wanting those who say that the cases treated could not have been *Bacillus Alvei*. In answer I must say that I have not passed through one of the most terrible experiences with the genuine foul brood without gaining the most intimate knowledge of its character. In the case of the cottager I had samples submitted to me, and nothing availed him in reducing the plague until he got my explicit directions as to treatment. We have also the history of his neighbour's bees which died away because the owners would not take the trouble to cure them.

In the other two cases given (and I have many others of like nature I cannot find space for), each of my correspondents had submitted samples to the *British Bee Journal*, and in each case the editor declared them to be the genuine foul brood.

Micro-Organisms not the Origin of Disease.

It is a fact, not yet acknowledged by the scientific world, or the medical faculty—a fact, nevertheless, which I am in

a position to prove by numerous examples—that what are considered the most deadly microbes in connection with various forms of disease can be entirely ignored, where a rational form of cure is adopted, and no medicine whatever need be given to the patient; the cure being more effectual, and the system at the same time is given greater vitality—as opposed to the weakening, and not seldom destructive, effects of medicine.

What then becomes of the deadly microbes? Being simply an evidence, and not the “origin” of disease, they have no power for ill in the face of the healthy tissue established under a naturally regenerative system of cure. They are expelled both through the resumption of its normal action by that wonderful health preserver, the skin; and by the usual processes of worn-out matter passing off by the alimentary system. My final proposition in relation to bees will show what momentous changes can be created by developing a new condition of vitality.

Now, if microbes were the “origin” of disease, such cures would be impossible. It is, however, evident from the facts I present both now and hereafter, that micro-organisms are solely the “effect” of disease; though they may be, and often are, a cause of infection where a lowered vitality affords them encouragement.

New Light on a Dark Subject.

I am now presenting my readers with a number of propositions in regard to the origin, general development, and treatment of foul brood, from a thoroughly practical stand-point; placing on record only such statements as are supported by sound experience.

1.—*The Origin of Foul Brood is found in a fermenting mass of neglected dead animal matter and excretions, combined with the*

presence of a weakened colony, breeding and feeding amongst, and warming up to blood heat such neglected matter, which they in a deteriorated state are unable to remove.

Ever since my very severe lesson experienced over twenty-five years since I have held to this declaration as a truth to be maintained in the face of continued opposition from scientific investigators, and more recently I have been pleased to notice that among my supporters I have Mr. McEvoy, the foul brood expert and Government Inspector of Canada, who probably has handled—and cured—more of this disease than all other bee-men put together.

Our scientific friends say at once, “Dead brood can not turn into foul brood, and there can be no such thing as spontaneous generation.” It is of no use replying that I quite agree with them. Dead brood as they think of it, may remain, and even rot down, and no disease such as foul brood need exist. But, if they will only follow my proposition to the very letter, they may have the same experience that I have done, they will have the same ending to their experiments, and, a new light will enter their understanding.

Notwithstanding the expression has many times been thrown at me by prominent scientists, I do not support any theory of spontaneous generation, and until my critics will go over exactly the same ground that I indicate in my proposition—and none have done so—they cannot conscientiously assail my position. They rely upon what they know, and what most of us have known since my lamented friend Cheshire’s researches have been published on the subject, regarding the action of the *Bacillus Alvei* as a “continuing” cause of foul brood. Thus what is only a cause of infection is erroneously looked upon as the origin of the disease.

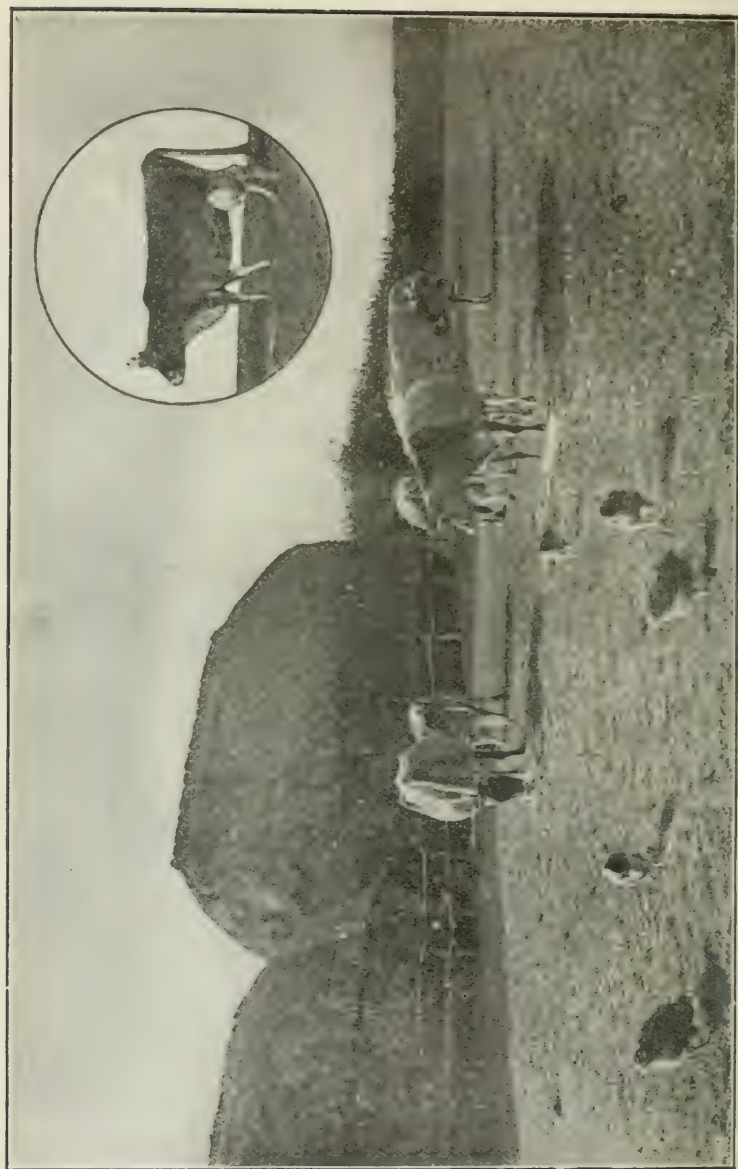
Decomposed Animal Matter and Excreta

When once gaining access to the food or water taken into the system of the living subject has resulted in infectious diseases (micro-organic) from time immemorial.

It should be self-evident that only healthy tissue existed prior to the arrival of that disordered condition which primarily enabled the parasitic microbe to live and thrive upon it ; *i.e.*, before there existed any other relative animal matter in a diseased state from which micro-organic infection could be carried. The same disease can therefore again "originate" in those combinations of matter acting in opposition to the laws of health, without any contact with existing infected animal matter.

One may build a new house, he may place there a family with no trace of disease for years before or after, and yet ultimately through some defect in sanitary conditions, that house becomes the habitation of disease, and a source of infection through the medium of micro-organisms therein developed. It may be the water is contaminated by the choking of a sewage pipe, but its contents nevertheless are the refuse of the inmates, and from them has been conveyed some hidden seed undiscovered and unsuspected until the suitable soil occurred for the seed to germinate and spread devastation around.

We may well consider that man carries within him hidden seeds of disease, which may or may not develop into destructive germs according to his conditions of living or vitality. It has even been suggested that though in perfect health, within his mouth may be found disease germs identical with those accompanying that dreaded malady diphtheria. And why should not the unsanitary conditions presented by our proposition—the living, feeding and breeding among the rotting dead—why



From a Photo

Some of the Author's Jerseys.

by Mr. Claude F. Light.

should they not, I say, result in organic disease? Then we have to admit that every colony carries within itself the primary seeds of disease which lie dormant while a natural vitality is maintained, and sanitary conditions are ensured. On the other hand, with the contrary conditions presented we arrive at the origin of foul brood, as distinguished from infection.

Foul Brood Without Infection.

It is my intention to show that foul brood can and does appear in a district hitherto free from the disease without importation from any existing affected hives.

Nearly thirty years since I had my first great battle with the dreaded destroyer. I should be correct in saying it was my only great battle with foul brood; for I fought, and conquered, and that too at a period when less was known about the complaint than at the present day. And from that time to this I have had only occasional experiences, solely with bees bought; sometimes from irresponsible people, whom I would be inclined to believe hardly knew what the malady really was.

However, in my own hands, these cases were always isolated, and my original stocks were never contaminated. The diseased bees were very soon on nothing but healthy brood, and I have often had to regret, as I do at the present day, that I have no material wherewith to carry out further experiments.

My early experience was such a very severe lesson, that I cannot overhaul any hive, however crowded with bees, or combs crammed with brood, without catching sight of the merest speck of diseased brood, and the value of the experience thus gained can be imagined when it is known that in all the years I have sent out bees I have not received one single complaint that disease has followed

the purchase. However, so that I may be doubly sure, for a long time past I have made a practice of sending out no bees as nuclei or stocks, unless they have been recently established on new combs, and it would be well for the general welfare if no others were sold. My apiary at the time referred to was in a perfectly healthy district, and I was so careful during the prevalence of the malady among my own bees that it did not extend to the neighbourhood. I was in the habit of driving and otherwise manipulating the bees within a radius of three to four miles, and in no case did I find the least evidence of the complaint.

How then did the plague find its way to my own apiary? How indeed! Well, I was engaged in a business which did not permit me to give any of the usual hours of the working day to the bees. Honey had been coming in rapidly, and I thought to relieve the brood combs of the new honey, just as many another enthusiast with the wonderful honey extractor liked to do in those days; but unfortunately my operation was carried out with the rising sun just beginning to smile upon me, and if I had not been so pre-occupied it is just possible I should have noticed him giving an approving nod at my industry, and a smiling whisper that "the early bird catches the worms."

Anyhow my catch was something of quite an unexpected nature, and ultimately most industrious labour indeed was required to undo that early morning's work. I can see now, the beautiful combs of healthy brood, and I can also see how utterly impossible it was for it to remain alive after those incautiously induced revolutions during the chilly morning air. At the time, however, and for months after I did not consider the harm that might result, and was otherwise too much occupied to examine the hives. I eventually found the combs almost denuded

of bees, and one mass of foul brood which by all appearances died immediately after the combs were passed through the extractor. As every comb in the respective brood chambers had been operated upon, the bees had become disheartened and could not remove so much dead matter, and after starting another smaller brood nest their efforts appeared to have been gradually restricted, until the conditions culminating in a state parallel with those set forth in my proposition, the combs were in the worst stage in which the disease of foul brood is known.

But how do I know this wholesale death-rate was the foundation of the complaint? *In the first instance the disease was found only in those hives operated upon during that early morning process.* It was first brought to my notice by another stock robbing one of the above, and henceforth foul brood was revealed to me. The robbing stock was the next to show signs of the disease. This was in early Spring; and then in one hive after the other specks of the disease began to show themselves. This, I have since found, was because I was not in the first place sufficiently cautious to cleanse my hands and implements after each manipulation, while in other cases the chapter of accidents was continued by using the same frames and hives again, though subjected to scalding.

Some of the hives within a few feet of those badly diseased, and whose brood combs were not disturbed at any time, remained perfectly healthy. The rest of the apiary was finally renovated by starting the bees on new combs in new frames, after the so-called "starvation" treatment.

I do not stand alone in my conviction that foul brood may originate in a district where hitherto it has not been known, and without being imported from an infected source. Mr. McEvoy, in particular, has offered much con-

vincing evidence on this point, from extensive experience gained while carrying out his onerous duties as Foul Brood Inspector in Canada.

He gives numerous instances of foul brood resulting wholesale in large apiaries, hitherto free from disease, after being flooded so that most of the brood was killed, and the colonies of bees being so reduced, that after trying in vain to clear out the enormous amount of dead matter, continued to rear brood in small patches, until the usual result proved only too plainly that the living and the dead may not thrive and procreate in the same limited space without ultimately inducing an organic state of disease; the natural warmth, with its consequent fermenting effect being not the least agent in bringing about the final act.

2.—*The Secondary causes of Foul Brood are : (a) Robbing from an already diseased stock ; (b) Carelessness on the part of the owner in working from an infected to a clean hive ; (c) Mixing diseased combs and appliances with those of clean stock ; (d) Feeding with diseased honey.*

My second proposition does not, apparently, contain much that is new, and most of the clauses considered are already established fact. It was, however, only in recent years that some of the more prominent scientists could be brought to believe that honey contained the spores of the *Bacillus Alvei*. But there can be no doubt, and never has been in my own mind, that honey has always been the most dangerous medium for the propagation of the disease ; certainly it is the most tempting bait one may leave within reach of the olfactory senses of the bees, who are ever on the alert ready to appropriate that God-given sweet, even though the death-dealing touch of the dark-angel may be upon it.

In years long gone by I have found repeated cases of disease being started in the previously healthy combs of

colonies which had been traced robbing from a diseased source ; and this has been quite a general experience.

I next come to the question of carelessness in handling stocks. During my own experience I found no sign of the disease being permanently cleared off until that " extreme caution " born of repeated disaster and hard experience taught me never to work from *any* hive to another, whether infected or clean, without disinfecting everything used, including the hands, after each operation. A correspondent bewailing the unfortunate state of his apiary, in the most matter of fact manner states : "*Every hive I examined* became infected."

The mixing of combs and appliances may be carried out quite innocently, and often is done, before the apiarist is aware he has the disease. This causes a lot of trouble, and the owner of the apiary begins to think the disease is spreading from one stock to another with a lightning-like rapidity ; when in fact, nothing could be farther from the truth. As in handling without care, so in this case it is simply a matter of infection by actual contact.

Feeding with diseased honey is a subject which requires careful consideration. I do not feed with honey, and have always condemned the practice as regards bought honey. One can never feel safe in using such for feeding, and candy offered as partly made with honey should be rigidly excluded from the apiary.

The honey found in diseased stocks which are reduced to death's door, is seldom in sufficient quantity to be worth saving, and the combs should be destroyed just as they are in the frames by the one great purifying element—fire. On the other hand stocks not so far reduced may be made to use up their own stores (without daubing the extractor, and a hundred other things) in the manner I have already set forth, and by other means I shall later dilate upon.

3.—*The disease is probably never communicated without direct contact.*

I now come to a proposition that probably does set forth a new theory, which however I trust has already been reduced to fact by my own practice. During my severe trial of many years since, for two to three seasons in succession I had several hives standing within a few feet of others diseased, but for the reason that the combs of the former were built across the frames, having been purchased in that condition, they escaped ordinary manipulations, and were simply supered each year. Strange to relate, these stocks quite escaped infection, and the fact largely helped me in finally clearing the apiary, because I quite saw I had previously been the means of infecting further hives by not being sufficiently careful. I then had no hesitation in saving all the brood combs but slightly diseased, during the gradual decline of the malady, and I began to get the upper hand of it. Thus one or two queenless stocks were made to take such brood combs as another stock would be completely renovated, and when all the living brood had hatched, those stocks were finally renovated and the combs destroyed. Then at last I knew once more the true pleasures of bee-keeping, and enjoyed the sight of all healthy stocks with the combs occupied by larvæ of the usual pearly whiteness, which denotes health, vigour, and an end to the long period of anxiety and losses.

I am convinced that the spores of the disease need cause no anxiety just because it is considered they may float in the air and would naturally adhere to one's clothing. I had another apiary some two miles from the one then suffering from the disease, and I would go straight from the infected stocks to this apiary, and make the usual examinations. My hands only had been cleansed, but

during the whole period the said out-apiary remained perfectly free from the disease. I have stronger evidence to show you yet, that even the bees themselves do not carry infection by leaving their own diseased stock and entering a clean hive, but this will be explained in due course.

4.—*Bees flying from their own diseased hives do not carry infection to any point of contact with other workers, from, or in other hives, except only under the conditions of natural swarming; e.g.: (a) No disease is communicated from flower to flower in consequence of the visits of such bees. (b) No outside watering or feeding apparatus is thus contaminated. (c) A bee flying from its own (diseased) hive may enter a clean hive without danger to the latter.*

In proceeding to give proofs in support of clause *c*, I shall have shown sufficient to prove all other points contained in my present proposition.

Some of my most remarkable experiences occurred a few years since, when I carried out a bold experiment which entirely changed my own views as to the nature and destructiveness of foul brood; for whereas formerly I considered the combs must be destroyed utterly, I am now able to point to perfectly clean combs which were at that time diseased, *and yet they were not medically treated in effecting the cure.*

The said experiment consisted in exchanging places with two stocks; one of which was badly diseased, but strong in workers, old and young, while the other was more backward but perfectly healthy.

And the result! Well, it will astonish the reader to know that the healthy hive remained perfectly clean, though it received the whole of the working force and a great number of the younger nursing bees of the diseased hive. But throughout this experiment it is to be distinctly understood *the bees were not first smoked or in any way*

intimidated, so that the normal condition of the workers was not upset in any way. They did not therefore gorge themselves with honey—but the workers in the fields from the diseased hive returned to the clean hive then in its place.

The next case was simply one of *increasing* from a badly diseased hive which had a native queen. At the middle of a warm day the hive was lightly smoked and the queen removed, so that she might be left in a clean hive on the old stand, with foundation in the frames, to collect the flying bees. They were given one frame of healthy capped brood as well, while the original hive of combs was removed to some distance. The young bees in the latter were without a fertile queen for some three weeks, by which time they had one laying, from a queen cell given them. In the interval, honey coming in rapidly, the whole of the diseased matter was cleaned out by the young bees; and after the young queen started laying, everything continued so satisfactory, and perfectly clean, that another division of the stock was made in July. The first swarm continued to build up nicely, and no sign of disease was at any time evident. Turning a diseased stock into three strong and healthy colonies was certainly better than destruction.

This is only one example of others that were treated in precisely the same way—making healthy increase instead of destroying the original; but it must be borne in mind that no bees were shaken from the combs, the whole hive was removed with as little disturbance as possible, the operations were carried out with stocks before they were allowed to become seriously depopulated; the time was favourable for swarming and rapid honey-gathering, and lastly, but almost more important than all, there remains the fact that the diseased combs were covered with none

but young bees, and these being queenless for a period, cleaned out every vestige of the disease before the young queen again made up a brood nest.

Make a note of this last fact in big capital letters, for I have never known Italian or Carniolan bees (with a virgin queen) when fairly numerous, to refuse to clear out all evidence of disease during the active season of honey gathering. Nevertheless, our scientists are puzzled right here. Even though they be witnesses of the above facts, they will still adhere to a theory of the indestructible nature of the Foul Brood spores.

There is a more simple way of disposing of Foul Brood spores than by boiling. *The principle of germination is at once their power and their own destruction.* It is simply a question of manipulation by the bee-keeper, at the right moment, for, strange as it may appear, the above results were attained without medication, in any form.

5.—*The spores of Foul Brood need not be dreaded, as they may be destroyed by a most simple and efficacious process, which is that of causing them to germinate where such germs find no congenial soil; as also where a suitable antiseptic immediately acts upon them, so that they have no power of reproduction, or of maintaining their own existence.*

The spores are considered by scientists to be indestructible; they will not freeze, no heat can kill them, no germicide destroys them. This is the theory to which non-practical teachers adhere; they will tell you of "cultures" made in various substances in sealed tubes; they will explain how the *germs* cannot exist where certain medicinal agents are introduced, but do what you will, no germicide, they say, will destroy the spores.

These writers, nevertheless, not only deceive themselves, but are like the blind leaders of the blind, and in following this theory teacher and student alike fall

into the pit of destruction together. If these teachers would only realise that a *cold culture* will not readily cause the spores to germinate and thus meet their prepared destruction they would then see how far they are from giving material aid to suffering bee-keepers.

It is a fatal error to teach the indestructible nature of the Foul Brood spores, for in that they readily germinate in the living temperature of the populous hive, they are easily disposed of in detail, and therefore, with a little assistance, the fairly strong colony will have no more of them. Only cause the spores to germinate where the said germs find no means of continued propagation and sustenance, and there is an end of them.

I have repeatedly proved by practical demonstration, in fact, and in results, that a fairly strong colony will, under certain conditions, give no resting-place to spores or germs, either with or without the aid of medicinal applications.

Look at the method employed by Mr. McEvoy, of Canada. The original combs are all removed, the bees brushed back into the same hive where they are not confined, but having been supplied with frames containing starters only, are allowed to remain three days, and build what comb they will. The whole of this is then removed and the bees placed straight on to foundation. The hive is not, neither are the bees, disinfected, or fed with medicated food; and in not one, but in thousands of cases, has this treatment resulted in a perfect cure. Where are the dreaded spores? Surely the bees should have been scalded if the scientific (?) opinion holds good as to the otherwise impossibility of killing the enemy.

Mr. McEvoy considers the bees use up all the diseased honey they have in building the new combs during the three days. Possibly they do, but the probability is that

when shaken from them they still have some of the same honey, though this is apparently all used up before the foundation can be used for storage. Even then it is some few days longer before larvæ makes its appearance. But, again, asks the scientist, what becomes of the spores? The fact is, in the meantime they have germinated without the means of reproduction. But why hitherto has this point been overlooked?

I must also consider the so-called starvation plan, which is very similar to the above, except that the bees are confined without the means of comb-building for some forty-eight hours. And, again, what becomes of the great enemy? for without giving any medicated food, in years gone by, I have often cured in this way. There can be only one reply to the query; the act of cure is the same in both cases.

I come now to the apparently more intricate cases as presented in problem 4, where the disease was not only once, but repeatedly disposed of without destroying the combs, without medication, and with no manipulation of the diseased cells whatever.

There was in each case granted an interval of two to three weeks without a laying queen, during which space of time the population being numerous, and honey coming in, all the diseased matter was disposed of. Even then we have been taught to believe the bees could not dispose of every cause of infection. But what are the facts? The bees having thoroughly cleared out every particle of the soil suitable for the germs to thrive in—and *this they will not readily do all the time they have a laying queen*—any spores left in the hive were bound to germinate where there was no soil to support them, therefore their existence terminated.

Consequently we now see that the spores which might

remain indefinitely without germinating in a comb *removed* from the genial temperature of the hive, are as it were, under a forcing process while remaining there during the active period of summer. Moreover, where a suitable remedy such as Izal is used to combat the disease, it acts in the presence of brood in a manner similar to the removal of brood without medication. In each case the germ reaches a finality without reproduction, because there is no soil for its further development.

Foul Brood Correctly Named.

Every experiment resulting in a successful cure goes to disprove the theory that *Bacillus Alvei* is, as some will have it, a disease of the bees. Take away the brood, or the means of continuing its production, and behold the bees need no medicine to cure them, while they are almost at once capable of tending a perfectly healthy brood nest, and of keeping it so. Then again the germs of disease, when present in the bees, are only to be found in comparatively small numbers. The soil is not suitable for rapid development, and should a worker die, the extent of its malady is confined to its own body. In the workers the disease does not pass from the dead to the living. In the larvæ that is its most terrible means of infection.

The same state of restriction is found in the case of the queen; for I have on numerous occasions during many years' experience, given queens from diseased stocks to those quite healthy, and on no single occasion have I found the complaint communicated by so doing.

Moreover, there is the fact of the exchange of stocks before mentioned. Not only were the large number of workers of all ages from the diseased hive incapable of transmitting the complaint to their new nursery, but the

same bees rapidly built up a weak into a powerful colony. The saving clause was that they arrived there without being frightened, and so did not first gorge themselves with their own stores.

Diseased Honey.

It would be strange indeed if honey in a foul broody hive did not become contaminated to a slight extent. But here again the spores have no suitable soil wherein to extend their numbers, which therein are comparatively small ; many investigators having been unable to discover any. This is not to be wondered at, for the humid summer temperature of the hive must cause them to germinate in detail, only to end their existence, for not only is there nothing in honey to encourage such parasites, but rather is it a substance detrimental to all disease germs, and in many cases a strong antiseptic in itself.

Boiling Honey.

Now it is a question, if after all, the act of boiling really does destroy the spores. The proof seems evident and simple enough that it does not. In the first place the process of applying heat alternately with cooling, is absolutely necessary. If boiling would do it the first application would be sufficient, but that is not so. It appears to be simply a question of germination, while the said germs are destroyed as they develop.

Consequently we have but one evidence of fact ; and that is the spores simply germinate during the intermediate temperature, the germs being destroyed at the next boiling, and the boiling followed by further germination, and so on till the process is completed. The logical conclusion, then, is this, that (a) the spores of foul brood may exist *indefinitely* in combs or honey stored apart from the bees ; (b) they *must germinate* rapidly among

clustering bees during warm weather; (c) the germs can only *increase* by reproduction in dead animal matter; and lastly, where the temperature is favourable for germination without the means of reproduction the end of the disease is reached.

6.—*The presence of Foul Brood in a hive is an evidence of low vitality.*

How do we know this? The facts supporting this proposition are unassailable; and they are numerous. In the first place I will call attention to the opinion of nearly every writer who has had any acquaintance with the disease. All agree that the complaint is most virulent in the early spring. It gets a hold of the colony hardly before it is aroused from its winter's slumber, while the workers have as yet no incoming stores, and what little activity is apparent is only intermittent, such as the brighter intervals of sunshine tempting a few of the workers to gather fresh supplies of pollen. Otherwise the bees sit quietly upon the combs covering the slowly developing brood nest; and though only specks of the malady at first appear, long before general activity is aroused the brood may be half dead and putrid, while never a bee has attempted to remove the foul matter.

But, you go one fine morning to the apiary later in spring, and the bees are tumbling over each other in their hurry, while many are so loaded as to reach the entrance laboriously. Ah! that means honey, natural excitement, new vigour and vitality! Watch now the combs from day to day of any colony that has not become utterly depopulated. There will be no further extension of the malady, but first a restriction, then a decline, and with such manipulation as I have already offered my readers, finally a complete cure. Indeed, what disease can stand in the face of a renewed life, a greater vitality built upon

new food which is creating such active tissue as bids defiance to disease germs.

Then again, suppose you remove the queen, not because she may perpetuate the disease, but just to give the workers a rest, for there is nothing in any state of life so wearing as the giving of one life for another, in driblets, as it were. After such removal the bees, soon having no nursing to do, turn their attention to cleaning out the foul cradles, and presently everything is so neat that one would never imagine disease had so recently lurked in many of the cells. Of course, a queen-cell must be given them, and if this is done during the active season, the improved tone and vigour of the workers is such that the brood nest shortly developed by the action of the young queen, is proof against further inroads of the disease.

Nevertheless, though I have shown that in such cases a rousing activity will always end in a cure, I do not by any means advise such attempts to be made by any but experimentalists, without the free use of Izal, in the manner I have frequently set forth, as success is then doubly assured.

Former failures with Cheshire's remedy, and others that have been brought forward from time to time, have resulted largely *because this great principle of vitality has not been first raised* before the operator started in his attempt to cure. What did Cheshire do? The stock he operated upon was so nearly depopulated, as well as being queenless, that as a matter of necessity, before he could proceed at all, he added a comb of healthy bees and brood with a new queen. Here then was the real foundation of his cure, and without knowing it himself, he was both misleading himself and others who attempted to follow him, inasmuch as he pointed out that Phenol was the cure, and that alone.



CHAPTER IX.

MODERN HIVES.

HOW CONSTRUCTED AND FURNISHED.

THE chief feature of the modern hive is that each comb is built in a separate frame, enabling such to be removed at will without force, and without in any way soiling or injuring the comb. Each frame stands about $\frac{5}{8}$ -inch from its neighbour, and $1\frac{1}{2}$ -inch from the centre of one to that of the next, though this space may be varied to suit different requirements as hereafter shown. The frame rests only upon or in the hive proper by a lug or ear at each end, and a space of not more than $\frac{3}{8}$ -inch must be allowed between the two end bars of the frame and the walls of the hive ; while not less than $\frac{1}{2}$ -inch should be provided between the bottom rail and the floor ; or $\frac{1}{4}$ -inch at the sides.

I present to the reader a simple hive with eleven frames, occupying a space across the case, inside, of $16\frac{1}{8}$ -inches ; and another hive with frames, equally as simple, but more complete, having an outer case as shown in the illustrations of Simmins' "Conqueror," which was introduced to bee-keepers in 1888, as the perfection of his "Non-Swarming System" offered some years previously. Also a



FIG. 8.

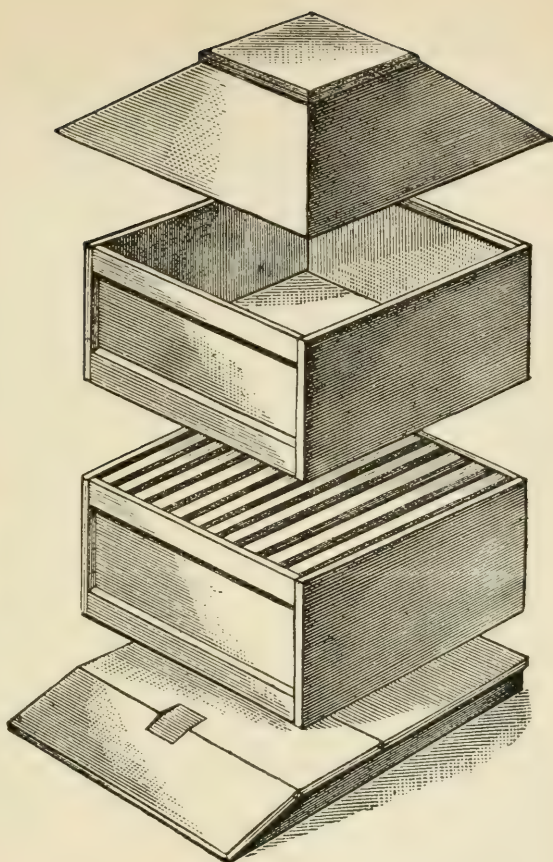


FIG. 11.
Design of "Economic Hive."

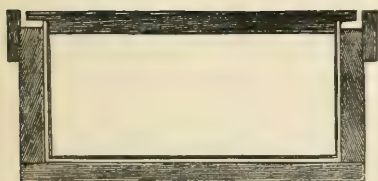


FIG. 9.
Position of Frame
resting on zinc runners.

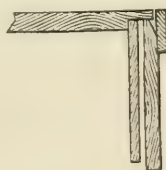


FIG. 10.
Frame end resting
on bevelled edge.

very practically arranged hive with frames 16-inches by 10-inches, the more suitable size for commercial, as indeed for all highly profitable purposes.

THE ECONOMIC HIVE.

This is a most simple and yet substantial hive, made from $\frac{3}{4}$ -inch white deal. It contains nine frames and two dummies, and the width of the hive inside, measuring across the frames, is $16\frac{1}{8}$ inches. By removing the dummies there is room for eleven frames for ordinary spacing, or as designed by me for close spacing in the first instance, twelve may be used only $\frac{1}{4}$ -inch apart. I have practised crowding and close spacing ever since foundation first came into use, finding it gave a more compact brood nest and less room for stores below.

The same idea has since been brought forward in America, with the claim that it prevented the issue of swarms, as the bees would not, it was supposed, store in such shallow cells as this arrangement enforced, and on the other hand would be prevented from breeding in the thicker store combs (sections) above. In neither case, however, is this correct, as I have many times found that not only do bees store and cap combs which are even thinner than required for brood, but also that the thickness of the combs in sections above is not the least hindrance to the bees breeding there, as they simply reduce the length of the cells to suit their purpose should the queen be crowded by mismanagement below.

The Economic has a floor composed of one piece of board $17\frac{1}{4}$ inches by 11 inches, and another $5\frac{1}{2}$ inches wide of the same length. The two are halved together, and a $\frac{1}{4}$ -inch rabbet cut out round the upper edge to keep wet from settling under. Another $5\frac{1}{2}$ -inch board, bevelled on the edge, forms the flight board, and is

detachable, being secured by simple hooks, or hinged, if desired; the object being to ensure that there is no projection in the way when packing and travelling.

The front and back boards are each $16\frac{1}{8}$ inches long by $8\frac{3}{8}$ inches deep. Both of these are bevelled along the upper edge, to give a thin ledge for the frames to rest upon. The two side walls are each $17\frac{1}{4}$ inches long by 9 inches wide, and overlap the back and front walls so far that exactly $14\frac{1}{2}$ inches are allowed between the two, being $\frac{1}{4}$ -inch to spare beyond the length of the 14-inch standard frame at each end. A plinth, $16\frac{1}{8}$ inches by $2\frac{1}{2}$ inches, is inserted at the top and bottom between the two 9-inch sides, filling in the space left at the ends of the top bars, and at the same time being a very convenient arrangement for lifting the hive. The permanent entrance is three inches wide and cut out of the floor, but full width can be given by sliding the hive forward.

The Cover

is cut from 11-inch stuff as shown in Fig. 04; the long edge being 21 inches and the other $7\frac{1}{8}$ inches. The bevelled edges for mitreing at the joints may be cut off on the saw bench, or even better, by hand, straight from the plank in the first instance, reversing the plank at each cut. Otherwise, the inside edge should be gauged at $\frac{3}{8}$ -inch, and then planed down to the mark, leaving the outside edge untouched. Nail together with at least five 2-inch brads down each side. The top square is 11 inches across and screwed on from inside. There is no economy in planing the wood other than on the outside; but where this is not done it requires very much more paint, and is liable to rot, as the surface cannot be so well covered.

The Standard frame and dummy are as represented,

Figs. 05 and 06; the top bar of the former being $\frac{3}{4}$ -inch thick instead of the usual weak bar of only $\frac{3}{8}$ -inch thickness. The top bar may be either $\frac{7}{8}$ -inch or 1-inch wide, the former being generally adopted.

All covers must be painted on the lower edge and two or three inches up underneath as well. The floor requires painting at least three inches from the edge all round both top and bottom, as also the bottom edges of all compartments. This is too frequently omitted, when the hive does not last a fourth of the time it should. So long as all in sight is painted that is generally considered sufficient, whereas the very parts left undone happen to be the most vital, as it is at the joints that the wet settles and soon causes mischief.

Simmins' Thick Top-bar.

Having used a top-bar from $\frac{3}{4}$ -inch to $\frac{7}{8}$ -inch thick for nearly a quarter-of-a-century, during the whole of which period I have strongly condemned the thin $\frac{3}{8}$ -inch bar generally manufactured by hive-dealers, I am so strongly convinced as to the superior advantages of the thick top-bar that I must urge all to use no other.

The thick bar is not so readily built over by the upward extension of the comb, while I have frequently pointed out that the queen is less likely to travel over it into the supers, hence one reason why excluder zinc may be dispensed with. I have carried out so

Many Experiments with Frames

in various styles that my readers may be assured the plain frame $\frac{7}{8}$ -inch wide is the best to adopt as herein illustrated. Top bars varying from 1-inch to $1\frac{1}{2}$ -inch have repeatedly been tried, only to be discarded as non-practical. So also with wide ends, or close-fitting frames.

The Frame of the Future

must have no projections of any kind beyond its $\frac{7}{8}$ -inch width, for the time is surely coming when such impediments to rapid manipulation will be permanently discarded.

SIMMINS' CONQUEROR "HANGING-CHAMBER" HIVE.

In hive construction I presented in my 1893 edition the very novel feature of whole bodies **HANGING** as do the brood frames, and notwithstanding the clear bee-space allowed all round between each upper and lower rim of the respective boxes, the sections are carefully secured against cold by the judicious arrangement of the quilting ; while upward ventilation, around the sides may be allowed or entirely prevented at will, simply by the careful adjustment of the same.

This hive, which I had under serious consideration when my Non-Swarming System was inaugurated,* is in many important particulars quite different to any yet introduced. This plan has been before bee-keepers for many years, and has met with approval from all who have followed the plan intelligently ; but so many of the hives in use are unsuitable for carrying out the method, that the novice has often found it difficult to adopt with the hives he has on hand. I therefore introduced during the season 1888-89 the above improved Non-Swarming Hive, which gives (1) plenty of room in the right direction, (2) perfect ventilation at all seasons of the year without draught, (3) the most complete shade during the hottest days of summer, (4) the greatest ease in manipula-

*Special Prize Hive, South Kensington, 1878 ; Simmins' Non-Swarming Pamphlet, 1886.

tion, as the lower body may be examined, also the upper, or brood nest proper, QUITE INDEPENDENTLY OF EACH OTHER, also without removing the supers. The latter points in particular, will be welcomed by many bee-keepers, who, while anxious to examine the brood nest or non-swarmer chamber under it, frequently neglect to do so rather than be obliged to shift the whole lot. For a period extending over a term of twenty years I have had hives in use having a deep outer case, and from these my best results have invariably been secured.

Within this Hanging-Chamber Hive we have first the lower chamber (whether shallow frames or sections, or a second stock hive arranged for prevention of swarming) which touches neither the floor nor stock chamber proper above it, thus entirely doing away with propolis at these points, and enabling such non-swarmer arrangement to be examined with ease at any time. The brood chamber comes next, and on this the supers may rest if desired. The hive is also used with neither of the supers or chambers touching its neighbour, either for extracting, or comb-honey production.

Room is allowed for three to four sets of sections where one is first worked under the stock in place of another body of frames. The hive proper is capable of holding either eleven or twelve frames, while the lower chamber will take as many more. For extracting, another takes the place of the sections, so that in all, nearly three dozen standard frames may be used for that purpose ; or eleven stock frames and 30 for extracting, when these are shallow.

The side walls of the body boxes are of the same depth as the frames, yet the space between the respective chambers is so carefully regulated that the distance between the several tiers of frames never varies. There are no two level surfaces drop upon each other anywhere

about the body boxes or supers, and therefore very little propolisation, and less risk of crushing bees.

Notwithstanding the open space between the lower and upper chamber (and the other compartments when so arranged), and around the same, it may be as well to meet any enquiry regarding this arrangement by at once stating that with frames or sections having wax guides directly under the brood-nest, comb building will never be carried on outside of the hive proper, and seldom to any extent in the lower frames, where the surplus is properly looked after ; except where the super of sections is started below with full sheets of foundation, and the entrance contracted meanwhile for the purpose of encouraging work there.

The Large Entrance Accommodation

is a great feature in Simmins' Hanging-Chamber Hive ; in summer it may be some 18 inches by 2 inches deep. Next we have the independent space all round the lower rim of the Non-Swarming Chamber, and between it and the floor, a further opening of 70 inches by $\frac{1}{2}$ -inch. But more than this, taking the upper spaces between three other chambers, we get another clear spacing equal to 210 inches by $\frac{1}{4}$ -inch deep, or a grand total of entrance accommodation of over 120 square inches. The fact cannot be denied that such a feat has never before been accomplished in a modern bee-hive, in solid workable practice, and with results in honey-production far in excess of the restricted, non-ventilating methods still adopted by the majority of bee-keepers.

Perfect Ventilation

cannot be secured in any other manner, either in summer or winter. Many of the old masters have striven to secure thorough ventilation by using perforated metal

and other devices, all of which failed utterly, through the bees immediately stopping every opening with propolis.

Brace-Combs, Burr-Combs,

or comb-projections and attachments such as are found between frame ends or under the sections, have always been the result of the old-fashioned crowding plan which the majority of bee-keepers still adhere to when working for comb-honey. But once and for all the apiarist should disabuse himself of this prejudice against Simmins' new system. Comb-honey is finished off just as well, or even better, and moreover in larger quantities, where so much space is allowed below the stock, and between all the rims of the non-contact chambers. And lastly, but not by any means the least desirable feature, is the fact, so strongly pointed out by users of this hive of advanced construction, that everything is cleaner and so much more easily manipulated than is the case with common hives.

With the space below the stock hive proper, never being completely filled or finished off, the bees are not induced to start inconvenient comb attachments at any part of the hive.

Going Backwards.

A prominent hive manufacturer endeavoured to show me how to avoid attachments between the several tiers ; another how to stop the bee-spaces between the several chambers, and yet have them slide as usual. But these friends have not yet realised that I have no need of such retrograde "attachments," that the hive itself is better without them ; and the progressive bee-master of the future will have none of them. The hanging-chamber hive with an unfettered bee-space between all rims, and a double bee-space between the lower chamber and the

floor, must certainly become the hive of the future when we consider it is both more profitable and more easily manipulated than others.

The Vital Question of Wintering.

My hanging-chamber hive fulfils all the necessary conditions for ensuring successful wintering in the highest degree. That the hive stands pre-eminent in this respect is shown by the fact that the stock chamber proper not only hangs quite clear of the floor, but may be several inches above it. It is then self-evident that the usual refuse and moisture collecting about the junction of the common hive and floor have no place in this hive. Every part is always dry and clean, and being thoroughly ventilated, because of such construction, with the

Heavier Foul Air

constantly carried away at the bottom, a colony of bees can maintain in perfection that semi-hibernating condition so essential to their well-being at this critical period of the year. Moreover the combs do not become mouldy, and therefore remain sound for a greater length of time. Consequently one of the

Most Important Features

in connection with this system is the fact that a vast population is brought into existence almost before the bee-keeper realizes the fact in early Spring. Unlike other laborious attempts to secure control of bees, the management of the Conqueror Hive is carried out, especially when controlling swarming, with the least possible disturbance to the normal condition of the constantly progressive colony.

A System

inaugurated by my prize hive at South Kensington, 1878 and perfected in my Conqueror hive introduced in 1888,

having stood the test of practical experience, while other ideas and plans based upon no positive system have come and gone, deserves the most serious consideration from all practical bee-keepers, seeing that it is founded upon sound economic, scientific, and natural principles combined.

The Complete Success

accorded to this hive and system must be the final proof of a correct construction and management, and the results of 100 lbs. to 200 lbs. of comb honey per hive, even in poor seasons, leave little to be desired by the ardent and persevering apiculturist.

The Conqueror Supers

are all fitted with double walls on two sides, while slotted dividers are placed at *each end* of the rows of sections, with a clear bee-space between them and the walls of the super, thus giving exceptionally free admission to the sections, and at the same time disposing of the old trouble of thin combs in the sections at the ends. Hence the process of comb-building is very rapid, and consequently the brood combs are not crowded to the exclusion of the queen, and the population of the colony is therefore maintained at the highest power.

For the sake of uniformity, the Association Standard Stock Chamber is also made with double sides; but the Commercial Chamber has single sides. All chambers are then of the same width, so that the same outer case is used for all, the same supers being worked with either a Standard or Commercial Stock Chamber.

The Removable Back of the Case

is adjusted in the most simple manner possible, the result of many years' practical study. It simply drops into its

place without any fastening whatever as shown in the illustration; hence I am occasionally amused by correspondents asking if hooks and eyes or hinges ought not to be used? Certainly not, unless you wish to go backwards over the same experimental ground that I have traversed, before finding the most practical method of securing the back. In addition to the above, the sides are made to "bind" inwards at the back, while the shape of Simmins' cover also aids in securing the top more firmly. In opening, the sides are slightly pressed away while at the same time the back is lifted up and outwards.

In Painting

it is quite necessary to give at least two coats of paint along the angle formed at each side by the rabbet; also up under (inside) the floor rim, and fully one inch up under the lower edge of the cover; otherwise wet is sure to soak up, and ultimately destroy the wood.

A COMMERCIAL STANDARD FRAME.

I must state without hesitation that the Standard frame of the British Beekeepers' Association is much too small for any bee-keeper who is attempting to produce honey on a wholesale scale. It is true I have been using the Association Standard frame largely for some years past, and expect to continue to do so as long as I supply bees to those who have adopted that size; but its use has only the more forcibly brought to my mind the decidedly superior advantages enjoyed when using a frame measuring 16 inches by 10 inches. Reference to the pages of the *British Bee Journal* will show that there were not a few who held out for a brood or stock frame of the above dimensions at the time the Association decided on the miserably small stock frame now almost universally used

in this country, and conspicuous among the opposition was that veteran bee-master, C. N. Abbott.

It would indeed appear that almost the sole reason why the present Standard was adopted, was because of its near approach to that of the "Woodbury" pattern, a slight alteration being made that it might accommodate six American $4\frac{1}{4}$ -in. by $4\frac{1}{4}$ -in. sections, and yet in practice scarcely one bee-keeper in fifty has ever brought the stock frame into use for that purpose. This very doubtful advantage was probably the *only* reason, not that the majority prevailed, but why that majority existed at all, for it is certain there were few, if any, extensive honey producers present at the Association meeting which then decided upon establishing one of the most serious hindrances progressive bee-culture has had to contend with in this country.

Great Security in Wintering.

Evidence in favour of the larger size, as giving greater security in winter; a larger population more rapidly developed in spring; less inclination to swarm; and at all times a more prosperous and profitable colony, with comparatively little trouble in maintaining that prosperity—has been accumulating right along, as shown by the practical results secured from such colonies as remained in the old frames used by myself and other apiarists, and which should have been, and will yet be recognised as the Standard frame in this country, viz. :—16-in. by 10-in.

It does not denote progress to hold to a certain size of frame simply because that has once been stamped as the Standard of the British Beekeepers' Association, whose committee, because of its peculiarly exclusive organisation, was not in a position to deal "understandingly"

with the commercial interests of either the producing or manufacturing industry.

There has long been a smothered feeling of opposition in some quarters against the frame now in use, and yet there are many who refrain from raising a dissenting voice for fear of coming into conflict with a recognized institution which has not one valuable point as a recommendation, nor a single excuse for its continued existence, seeing that every honey producer using the small frame is at a serious yearly loss, as he may soon ascertain on trial.

I have no wish to create confusion, or to induce loss by urging all to at once take up with the larger frame our old friend Abbott and other veterans attempted to have recognised as the British Standard. That frame has most certainly been *proved*, and I therefore recommend it with confidence as being far superior to the present Standard for the production of honey on a *commercial and profitable* scale.

My continued pegging away at this all-important subject, both in former editions of this and other works, and by circularising some thousands of my correspondents, has resulted in a considerable revival of interest in the larger frame. Our old friend, "*The British Bee Journal*," has also, at last, allowed a free discussion of the matter in its pages, as public opinion aroused by the prominent facts I had constantly set forth, would be silenced no longer. I was asked by correspondents to join in the discussion, but as the position I had already taken up was so well known, I refrained from so doing. Having had the Commercial Frame (so named by myself) in use for upwards of thirty years, side by side with the Standard frame, my statements will doubtless be accepted.

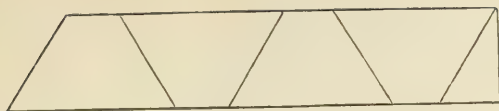


FIG. 04.

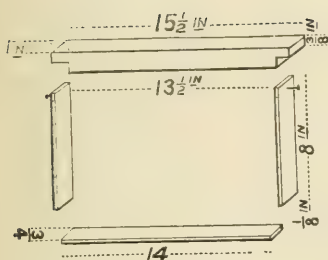


FIG. 05.
Standard Frame.

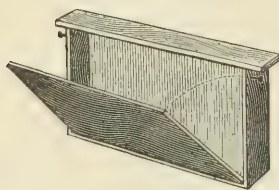


FIG. 06.
The Feeding Dummy.

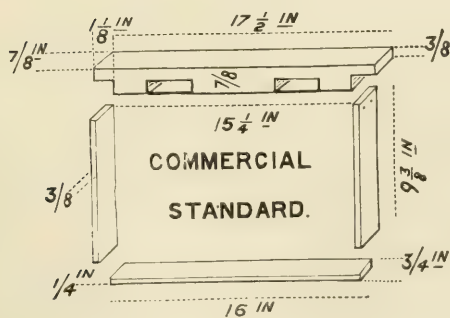


FIG. 07.

“How am I to Extract

from these large frames, having a machine that will only take the British Standard Frame?” This is a frequent query, but, my dear readers, why should you wish to extract from these larger stock combs? Your present Standard frames may be used for extracting, leaving the Commercial stock frames with their stores intact for winter. There is no economy at any time, but a serious loss *always*, where stores are extracted from the brood nest; but if any of the combs are heavily stored during the early summer, by all means remove any well sealed, replacing by foundation near the centre. The removed stores should be

A Golden Reserve

to be returned in Autumn, so that a full complement of good food will be assured for wintering. Such treatment will ensure colonies that will repay a hundredfold. Experiments made by various correspondents have not always resulted in favor of the larger frame; but the individual experimenters who think they have found no superior merits in my Commercial Frame, do not pause to consider

Some very Practical Points

which bear upon the subject. In the first place a new swarm started upon foundation, will not be upon the same footing as older, well established stocks in Standard hives, having sound, tough combs. In a test made with a single stock, the queen and bees used may not have been equal to the others, and it is quite certain a favourable trial can not be made unless several stocks are tested at the same time. Moreover, where native bees are used, they are not equal to the requirements of a large hive with large frames. Their powers are limited, and neither queen

nor bees of this variety can compete with a more prolific kind in the large hive. Hence, in striving to obtain the greatest average annual returns, the progressive bee-keeper requires a prolific race of yellow bees, selected also for other good qualities. It will therefore, readily be seen how misleading are some disparaging reports from those who think they have finally tested the matter.

“How am I to Stock the Commercial Hive?”

is a frequent question. Well, if you wish to stock it to the best advantage, of course you must begin well. You may unite, and at the same time transfer to it, two other stocks from standard frames, thus making a grand working colony at a stroke.

Then again, you may, towards June, select two good colonies standing near together; place the Conqueror hive between them to receive a swarm artificially made from each, and uniting with one queen. The standard hives, from which the swarms are taken will then be moved right away, and these again united, with the other queen presiding. Thus my plan of combined swarming and uniting, without increase, will give two rousing colonies for honey production. The entire contents of two straw skeps may also be made use of in the same way, if these are on hand. There is really no reason whatever for the bee-keeper to use single swarms and stocks when he is assured the same bees will be doubly profitable when united; while if worked singly, little or nothing may be obtained from them.

“If I Adopt Commercial Frames

what am I to do with my Standard combs?” is another query frequently presented. If not transferred to the Commercial frames the Standard combs will always do for extracting, and will be most useful for that purpose,



From Photos

Mother and Daughter,

[by Mr. Claude Flight.

as it is quite unnecessary, and not intended that the Commercial stock frames should be extracted from.

Convincing Facts

relating to the superiority of large frames and large hives were given some years ago by a writer in *Gleanings*, a prominent American bee journal. After stating that he preferred the Quinby frame, which is even larger than my Commercial, while at the same time he had also the smaller Langstroth frame in use, he says: "But as we found again and again, that the smallest crops came from the smallest hives, on the average, and that whenever the crop was short, twenty seven out of every thirty small hives had to be fed, while the large colonies had generally enough, we transferred all the bees out of these Langstroth hives. . . . For twenty years our large hives have given us better results than our small ones. . . . I have the *Bulletin d'Apiculture* for October, 1894, and I find in it *twelve selections* from letters coming from Switzerland, Belgium, France and Spain, praising the large hives and the "Dadant" hives, showing *by comparison* that they are more profitable than smaller hives."

Captain Hetherington, another extensive American bee-keeper, working nearly a thousand colonies at a time, is also assured that nothing but a large frame would give him a certain income year after year, and the position he has attained as a king among honey producers is undoubtedly one of the most convincing arguments I can bring forward.

For Comb Honey.

The Commercial Hive is used with eight frames and two dummies, 1½-in. thick, either packed or used as dry feeders; or the sides may be permanently packed, the object being to keep as *narrow* a brood nest or cluster as

possible, in opposition to the usual plan of adopting a wide supering surface above a shallow chamber. The latter does not give sufficient *power* below, neither does it properly economise power for the rapid and perfect production of section honey above it, as does a narrow but more populous cluster among our eight large frames, which arrangement provides for the more economic distribution and conservation of heat.

The principle of a *narrow deep cluster* must be continued throughout the whole tier of sections as well, and hence each crate of sections contains only three rows of seven sections. I have tried varying numbers upon different surfaces and find it a serious error to attempt to crowd many sections upon an extended surface.

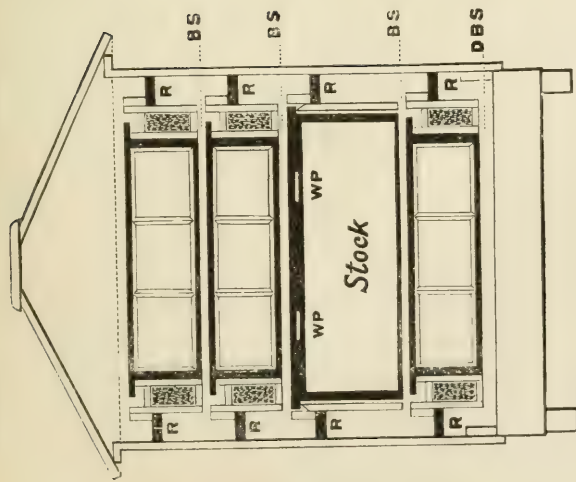
The section crates are double walled all round, and packed between, giving the most complete protection for the rapid perfecting of the combs of honey. The roof is made in the same manner as that illustrated for the Economic.

SUPER CRATES

to hold from 18 to 21 sections, can be made as follows: Put together a plain box of the size desired with neither top nor bottom, and wide enough to take three $4\frac{1}{4}$ -inch sections across besides the thickness of rails supporting them. Such rails are in the form of an inverted **T**; the sections resting upon the ledges which must not be more than $\frac{1}{4}$ -inch thick, giving that space between the sections and top bars of the frames. Any space left at the one end of the sections must be closed by a piece of wood to act as a dummy. This I prefer to fit only just tight, as both wedges and springs are quite unnecessary. With crates in general use for common hives, the

FIG. 12.

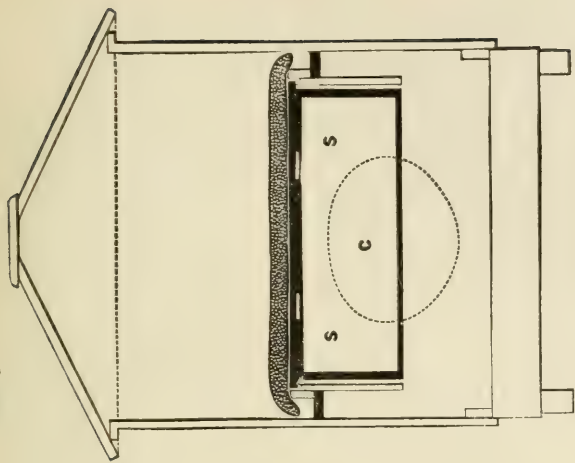
CLASS C.



DBS.—Double Bee Space. BS.—Bee Space.
R.—Runners. WP.—Winter Passages.

Simmins' Great Principle in Hive Construction and Successful Wintering.

FIG. 13.



S S.—Stores.
C.—Position of Cluster in Winter

Space between the sections and top bars

of the frames is objectionable, in that brace combs are nearly always attached to the underside of the sections. To avoid this entirely, in 1881 I adopted a crate with the bottom composed of slats standing $\frac{3}{8}$ -inch apart. When in position these slats come close upon the frames, but at *right angles* to them ; thus the bees have simply a number of small holes for passages—about $\frac{3}{8}$ -inch by $\frac{1}{2}$ -inch, which they are compelled to keep open ; no brace combs are built in consequence, as those are always continued from the wax that may be along the sides of the frame bars, when the old plan is allowed. During the many years I used this style of crate I had no brace combs attached to my sections.

Fig. 16 will give a good idea of the manner in which the said square passages are formed ; C being the bottom slats of the crate, and D the frame bars.

But now having the slats close upon the frames it will be readily understood that a full-sized crate could not be used without much inconvenience ; I therefore made it in two as seen in Fig. 17, each holding twelve to fifteen sections, and have had no more difficulty in removing one-half at a time than in taking out a frame of comb. In replacing them a gentle horizontal motion will cause every bee to run down out of the way, though smoke first used will at once clear the course.

But perhaps the most important point with my twin crate, is that as the central combs are completed, by simply turning the outer row to the centre, the whole are finished off more evenly and in less time, and thus the usual outside thin sections are a thing of the past.

With this class of crate I have generally used my bee space sections giving their own passage under, but if the one-piece section is used strips $\frac{1}{4}$ -inch thick should be

inserted for the lower corners of the sections to rest upon.

In the Conqueror Hive, the space below the stock prevents that over-crowding which induces the building of brace combs in old-style hives.

SECTIONS.

The one-piece sections wherein the new comb-honey is built are made in two forms, either with a bee space at top and bottom, or such spaces on all sides. In the latter case it is proposed to give free communication throughout the entire crate instead of through each row of sections only. The advantages of intercommunication are doubtful, while the section of comb is certainly more difficult to handle, does not look so neat, and cannot be so conveniently packed for market as the old style.

The widths in general use are—2 inches to be used with separators, or $1\frac{3}{4}$ inches without; each $4\frac{1}{4}$ inches by $4\frac{1}{4}$ inches, to hold 1 lb. of honey. Sections to hold 2 lbs. are not in demand, but those to contain about one-half pound may generally be disposed of; these should be $1\frac{1}{2}$ inches through, $4\frac{1}{4}$ inches deep, and barely 3 inches wide.

A deeper and narrower section 5-inch by 4-inch is now used to some extent. Its advantages being that the purchaser is made to think he has more for his money. Thin combs are sealed more quickly, but a total change of furniture is a serious matter to most bee-men.

Folding Sections.

By making a block to fit the inside of a section, fastening it horizontally to a table, the operation of folding is carried through at a rapid rate, and one can always be certain of them coming true to square. With a lever and cramp motion to take the strain at two opposite corners, the tenons may be locked together as fast as the

sections can be laid on the block. In dry weather these sections must first be damped at the V-cuts, or many will break.

The one-piece section has now taken such a hold in general estimation that no other style will ever supersede it; but where the apiarist has the time and convenience to make for his own use, my simple bee-space section will cost him even less than the other.

Simmins' Bee-space Sections.

These were introduced in 1880, and the comb-honey in them has been much appreciated wherever offered for sale. Glass was used for the top and bottom rails in the first instance, and the top rail was split to receive foundation.

The side bars are each $4\frac{1}{4}$ -inches long by $1\frac{3}{4}$ -inch wide, with a sawcut across each end, at $\frac{1}{4}$ -inch from the edge, into which the top and bottom rails ($\frac{1}{16}$ th inch thick), are fixed securely; these being $1\frac{1}{2}$ -inch wide and $4\frac{1}{8}$ inches (bare) long. For half-pounds the sides are $4\frac{1}{4}$ inches by $1\frac{1}{2}$ -inch, and the thin rails $1\frac{1}{4}$ -inch by $2\frac{3}{4}$ inches.

If the sections are required flat, the top and bottom rails must be a little thicker, with a tongue and shoulder as shown by Fig. 27. In that case the sawcut in the side bars will be only the thickness of the horizontal rails from each edge.

Separators

are made of either thin wood or tin, and are generally arranged to allow a space above or below them of not less than $\frac{3}{16}$ th inch from the upper and lower part of the sections. One with slots, suggested by "Amateur Expert," who at one time was a contributor to the *British Bee Journal*, is illustrated (Fig. 28) with slots to correspond with the side bee-spaces in sections.

Where there are no side spaces in the sections, the slots are dispensed with.

When sections have no bee-ways they are used with fence or gate separators, having the bee-space fixed by cross-pieces which hold the several slats together. The first expense is greater, but the separators are stronger than ordinary wood dividers ; and wood is decidedly better than metal in every way.

Simmins' Simplicity or Makeshift Rack

has no bottom rests at all, and allows the sections to stand close upon the frames and upon each other, should occasion require. In carrying, the sections are allowed to bear upon the side strip, and when not in use the racks lie flat and take up little room.

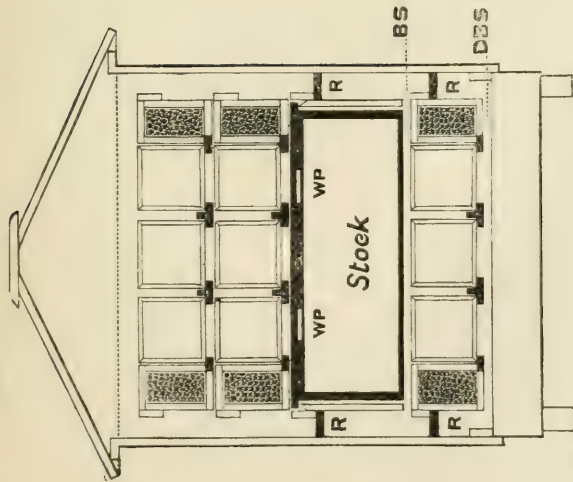
For years past I have persistently advocated the use of full sheets of foundation in sections, and found no better plan of securing such than by its insertion into my sections cut through on three sides, until in 1888 I designed my latest improvement in the shape of

Completely Divided Sections.

The advantages of these are—(1) the foundation requires no cutting up to fit each separate section, (2) a full sheet of foundation, filling three sections at once, can be put in as quickly and much more securely than inserting a separate piece in a single section, (3) the foundation can be worked out into comb, prior to the honey season ; and without trimming or fitting, or cutting in any way, the same may be inserted immediately and securely into the respective sets of three sections without any special fastening, (4) each set of three sections when in use and filled with comb can be handled in place of single sections,

FIG. 14.

CLASS A.

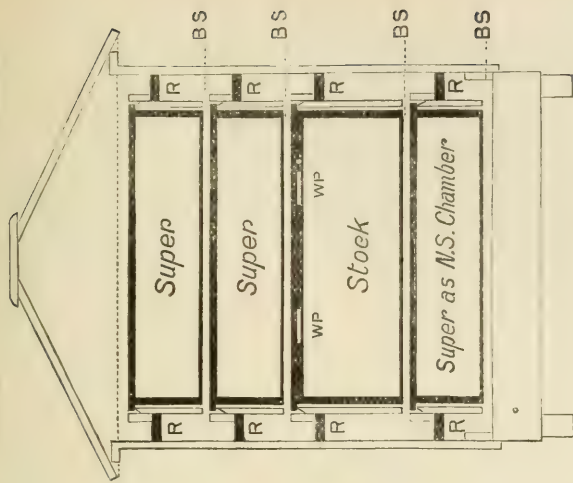


This sectional view shows the upper crates close, but either will work under the stock as in Class C.

Simmins' Great Principle in Hive Construction.

FIG. 15.

CLASS B.



Sectional view of Hive for extracting. May also be used with three Standard Stock Chambers.

with no possibility of either falling out during manipulation. (See Fig. 23).

My three-side-cut sections can also be used in the divided section frames, and answer equally as well when worked-out comb is not to be secured to start with, the sheet of foundation being placed across the three sections without cutting. This sheet of foundation is not quite the full depth of the frames, so that the usual stretching may be allowed for.





CHAPTER X.

COMB-FOUNDATION.

THE two or three frames illustrated, showing the foundation in the centre, will convey some idea as to its use. This artificially made basis of new combs is really pure beeswax, and the sheet is first obtained by dipping nicely planed pine boards into the hot wax; the plain sheet thus made is afterwards passed between rollers, which are so engraved as to give the wax the exact form and appearance of the natural mid-rib of all comb as the bees make it when left to their own devices, except that the comb foundation made by man gives the base of a more perfect, because more regular, comb than the insects themselves produce. The foundation is gauged to the size of worker cells (five to the inch); therefore, drone cells, and consequently drones, are excluded, while our combs are as flat as boards.

According to the thickness of the sheet required, whether for thin super foundation or for use in the stock frames, so many dips have to be made before the wax is peeled from

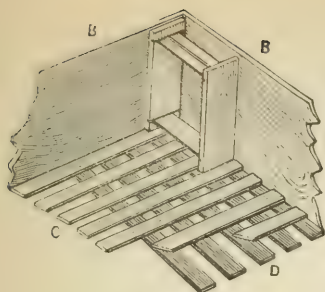


FIG. 16.
Position of Slatted Crate,
resting on Frames.

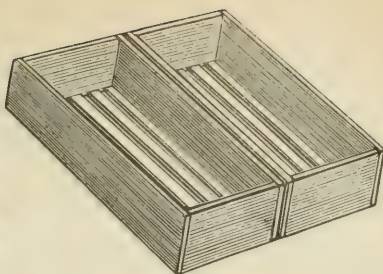


FIG. 17.
Twin Slatted Crate.

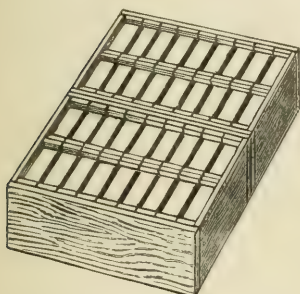


FIG. 19.
Simmins' Glass Rail Sections,
in Twin Crate.

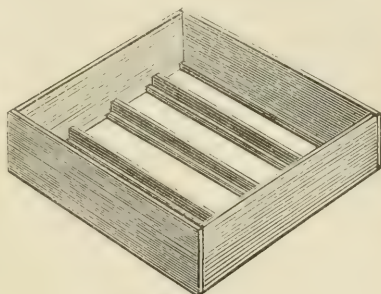


FIG. 18.
Crate, with T Rests.

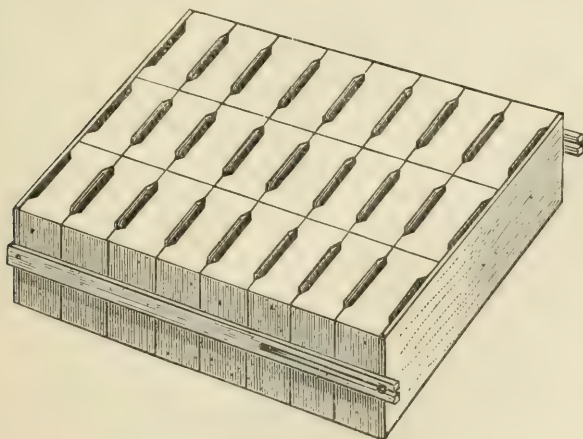


FIG. 20.
Simmins' Simple Rack.

the boards. Of these, two or three sets are required on hand standing in water, to give time for cooling and saturation.

There are a number of machines in use such as the Pelham, Root, Dunham, Given, Van Deusen, and more recently the "Weed" Process. Of these, the Van Deusen gives the most beautifully finished foundation I have seen, but, being flat bottomed, the bees appear to waste much time in converting to the natural base; though it must be acknowledged that in doing so comb is produced that has so thin a septum as to be equal to any all-natural comb. I have been very favourably impressed with the Pelham foundation, principally because there is no pressure on the side walls; but I suppose this might be so with all machines if thinner sheets were used, so that the same need not receive sufficient pressure to be driven tight into the matrice, while the same thin base would be retained. There is no advantage in having high side walls in super foundation, as I find them in these foundations nearly always scraped off to the base before actual building is commenced by the bees. Indeed, that which I should consider a perfect super foundation would have nothing whatever but the bare base of the cells.

Foundation in the brood chamber gives a great saving in time under some conditions, as hereafter noted, but there are times when it is an unnecessary expense, more especially when the beekeeper has all the stock he requires, when he will become a producer of wax instead of a consumer of that article.

How to insert Foundation in Frames and Sections.

The original method, and one usually practised by myself, and others, is by melted wax run along the sheet of foundation on both sides where it meets the top

bar. A board, 7 inches wide and 13 inches long, has screwed on the back two strips of $\frac{3}{4}$ -inch stuff, which project about an inch over. The two projections on one side I have arranged as shown (Fig. 29) with a wide-headed screw to each, enabling the gauge to be regulated to a nicety. When set upon the inverted frame it stands $\frac{1}{8}$ -inch off from the centre of the bar, thus providing for the thickness of the foundation that it may hang exactly in the centre,

Simmins' Divided Section and Holder.

The foundation is secured to one-half of this section frame, or holder, by using a flat blade which is rapidly pressed along the edge as it lies on the top bar, at intervals of about 1-inch. The ends are not to be secured. The foundation is either first worked into comb, or the halved sections immediately placed on either side. Three halves lying on a flat surface are first covered with the half-frame having the sheet of foundation, when the blank half with the other portions of the sections is put to them, the foundation lying between. See Fig. 23.

For Melting Wax,

use a common glue pot, with a small brush or a spoon with its sides bent up to meet, allowing the drip to run down the angle, joining the foundation and frame securely. Remove the gauge-board while reversing and then wax the other side, with the frame always held at a slight incline, starting the wax at one end, and allowing so much that it will just run to the other end. Be careful that the wax is kept at an even temperature, over a small paraffin stove; if too hot it will weaken the sheet, and if too cool, it will not hold the foundation in place.

Other Plans

are such as have the top bar split nearly its whole or entire length to receive the sheet of foundation, when two or three nails or screws are driven through, holding the two halves together with the impressed wax between. There is little economy in so weakening and disfiguring one's furniture permanently simply for this one preliminary operation, while the open cut along the top of the bar is the very best harbour for the wax moth, as the covering over the frames adds still further protection to such crevices.

As a matter of fact, I have had no difficulty in getting combs built out perfectly true from foundation simply waxed to the top bars ; but the frames *must* be closer together, so that many bees do not cluster upon any one sheet. Through many apiarists failing at this point, foundation for brood frames has been made much too heavy, being only four or five sheets (standard) to the pound ; whereas I have no trouble in working full sheets at eight feet to the pound ; indeed, ten feet to the pound have been worked without sagging.

Where Swarms are Hived upon Foundation,

the frames should be spaced not more than $\frac{1}{4}$ -inch apart, with very light covering for the first few days, and a wide entrance.

Those who desire extra tough combs and well-filled frames, will find the most satisfactory plan to be that of

Wiring the Frames.

This is done by piercing holes through the top and bottom of the frames about two inches apart to receive the wires, while another is run from side to side in the shape

of the letter V. I prefer the parallel wires to run from side to side (Fig. 30) as the bottom rail is generally too weak to stand the strain, but in this case the sheet of wax must be secured to the top bar. Fine tinned wire is used for the purpose, and the starting point and finish should be at the same place where both ends are wound round a tack, which is then driven home, holding all securely. See that all the wires are drawn tight; place the sheet of foundation on your block; the wired frame upon that, and now press the wires into the mid-rib. Various instruments are used for the purpose, the Woiblet Embedder being the best, but a

Simple Embedder

can be made from a common nail filed up round at the point, with a slight indentation to run over the wire, which can be used at a rapid rate with a convenient handle. If the instrument is used cold the point must be frequently passed over a cloth saturated with oil.

Mr. A. I. Root, editor of *Gleanings*, and others in America, have been quite successful in the use of an electrical battery on a simple scale, and they find the process of embedding the wires thereby far more rapid and satisfactory than hitherto.

Sections should be Filled

with new white combs if possible, and never with anything less than full sheets of foundation. The former, when not worked directly into the sections, should be cut to go in tight; the latter, when used in sections having no saw-cuts, with about $\frac{1}{8}$ -inch to spare on two sides, and fastened by melted wax at the top. For gauging to the centre, use a block similar to that for large frames, but regulating screws can be placed on each of the four projections, so that the same block will do for any width of section.

Another plan is to make a saw-cut in the one-piece section as already shown, and when folded the foundation is combs are obtained, while for packing to travel long journeys, both this and the completely divided section give greater security than is obtained by any other plan.





CHAPTER XI.

HOW TO STOCK THE FRAME HIVE.

I HAVE shown the reader how to construct and furnish his hive, and will now explain the different methods employed for stocking the same.

The most simple is that of inserting a swarm. Good swarms of native bees can generally be bought from a cottager in May for 10s. or 12s. each. They would, in that case, be brought home in a skep towards evening, when they may be shot out upon the frames spaced as already shown and provided with foundation, when a piece of ticking should be laid over them so as to not quite cover the whole surface of the hive, when all will soon draw below. When they are quiet, arrange the quilt carefully, set on the cover, and give an entrance at least six inches wide. As the centre combs are built out and filled with eggs, part them and insert one or two of the outside frames of foundation in the centre of the cluster until eight or nine are well filled. By this time close the entrance to about $1\frac{1}{2}$ -inch, having previously added warmer material above, such as two or three thicknesses of carpet above the ticking or a tray of chaff or cork dust two inches thick.



Two-bee-way Section.



FIG. 21.

Plain Three-side-cut Section. Introduced 1886.

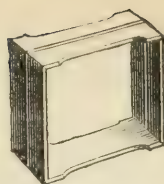


FIG. 22.

Two-bee-way Section, folded.

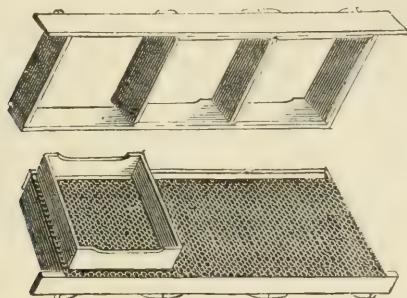


FIG. 23.

Simmins' Divided Section Holder, and halved sections, 1889.



Two-bee-way Section.



FIG. 24.

Plain Completely Divided Section in the flat. Introduced 1889.

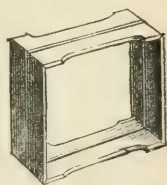


FIG. 25.

Halved section, folded.

The Author's Three-side-cut Section was first illustrated in his 1887 edition. His completely divided section and divided holders were introduced in 1889, and illustrated in the 1893 edition.

The plain (no-bee-way) section, Figs. 21 and 24, are from original engravings cut in 1892, and the Author's preference for no-bee-way or plain sections was first mentioned in the *British Bee Journal* some eight years earlier.

Best Time to Transfer.

Where one has straw skeps he will desire to transfer his bees to the frame hive. This can be done in April to great advantage, as it is just then that the stimulation does most good, and excites the bees to extend the brood nest.

The bees are first to be removed from the skep by either of the methods before mentioned (Chap. II.), when the best combs are to be cut to the right size to fit exactly tight into the bar-frame; all edges being cut quite square so that they fit together well, and can be more readily secured by the bees. Tie two or three pieces of $\frac{1}{4}$ -inch tape round the frames to keep all in place, and return the combs to the bees, which may first be shot into the bar-frame hive. They will soon draw among the newly-transferred combs and clean up their house, where, after a day or two, one will hardly tell where the joints were. Close up with division boards, cover up warm, and keep the entrance not more than one inch wide until it is absolutely necessary to make it larger. The patches of brood must be arranged so that the larger are at the centre, and the smaller graduating to either side, thus securing greater protection. Should the bees appear crowded with only the combs transferred, give a frame of foundation in the centre, and another as soon as they begin to cluster on the outside of the division board. Feed carefully so that there is always a little store in hand, but not enough to hinder the operations of the queen. Continue such stimulation until honey comes in.

It is so frequently recommended that the contents of fixed comb hives should be transferred twenty-one days after swarming, that I consider it advisable to show that this waste of time is quite unnecessary. The swarm should be hived upon six or seven sheets of foundation close to

the parent colony and facing the same way. Within ten days the young queens will be hatching out when a cast or second swarm would issue from the old stock. This appears to have been overlooked; therefore I advise transferring on the seventh day after the issue of the first swarm, first carefully removing one of the queen cells before drumming on the hive. While shifting the combs, cut out all the other royal cells, and after the operation return the one previously removed, which meanwhile should have been placed above the first swarm between the quilting to prevent chill. As soon as the young queen hatched therefrom is laying freely, destroy the other and unite the two colonies on the second evening following, when supers may be at once put on.

It is better that transferring operations be carried out in some warm room, or manipulating house, first laying a sheet of paper on the table whereon the tapes are to be arranged, with the frames on those, so that all is in readiness for tying as soon as the combs are fitted. While it is not absolutely necessary that the combs be fitted in just the same way up as they were built, it is not desirable to have them inverted, but to save material it is often advisable to put them in on end, or half inverted, as I have done for many years past. Certainly there is the brood to handle if transferred before the twenty-one days have expired, but with ordinary care this is not damaged, except where the knife cuts a straight line, and that is far preferable to having the combs full of honey.

Other Plans of Transferring,

such as the following, may commend themselves to either the novice, or those who have little time to spare.

The first is to place the fixed-comb hive upon the frames of the modern hive, with a slatted board between,

and allow the bees to work downwards on the combs or foundation placed for them. Towards the end of the season the stock will have its brood located in the frames, while honey will probably occupy the whole of the upper combs. This can then be removed, but the stock must not be allowed to starve, as it is quite likely very little store will be in the brood combs.

The other method is that of placing the skep or other fixed comb-hive in an inverted position immediately *under* the frame-hive, allowing communication through an opening in an improvised floor. In this case the inverted combs will be gradually emptied of everything. The stock will then take up its abode in the frames, and also work in supers above. These empty combs can then be transferred at leisure.

Uniting two Stocks or Swarms

when furnishing the bar-frame hive will always prove the more satisfactory process in the end; and this fact should never be lost sight of.





CHAPTER XII.

GENERAL MANAGEMENT.

WHILE it is my intention in this chapter to go through twelve months' management, and as everything depends upon proper treatment at this period, I shall begin with the

AUTUMN.

If the apiarist keeps only young queens he will have no need to stimulate the hive for the production of young bees at this time ; while the *only reliable stimulation* for early spring breeding is secured by correct autumn preparation.

Feed "Solid" in September.

I think most of us put off this feeding business as long as possible, and not always is it from idleness, but in many cases doubtless with the hope that some favourable spell of honey weather will bless us by helping the bees to fill up their combs naturally.

Mr. Abbott, the founder of the *British Bee Journal*,

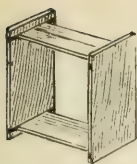


FIG. 26.
Simmins' Bee-
Space Section.



FIG. 27.
Simmins' 4-piece
Section.

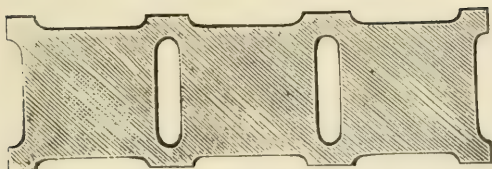


FIG. 28.
Slotted Separator.

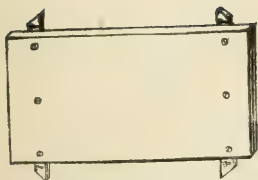


FIG. 29.
Foundation Guide
for Brood Frames.

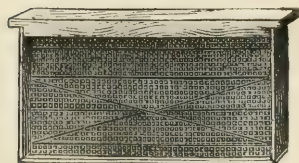


FIG. 30.
Wired Frame with
Foundation.

considered that feeding should be carried out slowly throughout August. This certainly is wise advice, but when that month is allowed to "slide" by ; or when the heather is relied upon and fails, then I repeat Feed "Solid" in September, and not later than the middle of that month, if possible.

Rapid Feeding the Only Safe Way.

In autumn rapid feeding does what ? It ensures a high temperature, and a high temperature ensures *sealing* of the combs so stored ; then a dry atmosphere, no matter how cold it may be during the winter.

Slow Feeding Means Waste ;

waste of energy, waste of life, and of time ; useless and protracted brood-rearing late into the Autumn. Waste of time the following Spring, as such overworked stocks will not start early brood-rearing.

Slow feeding does not stimulate the bees to that extent which causes them to "roar" in expelling the excess of moisture, hence a large portion of the stores remains uncapped, resulting in a cold moist atmosphere ; a serious, very serious detriment in winter.

Feeding 100 Colonies in a Week,

is not at all an impossible undertaking where one has suitable frame feeders, which hold twelve or fifteen pounds each. A strong colony will empty such a feeder in less than 24 hours, with little waste of energy. Consequently the whole winter's supply may not only be stored, but most of it will be sealed up in little more than a week.

From that time, without any further attention, breeding will steadily go on, until most of the uncapped stores will be used up, and finally, sufficient empty cells will be found

just where the bees decide to cluster, in the usual compact mass.

Leave all the Combs

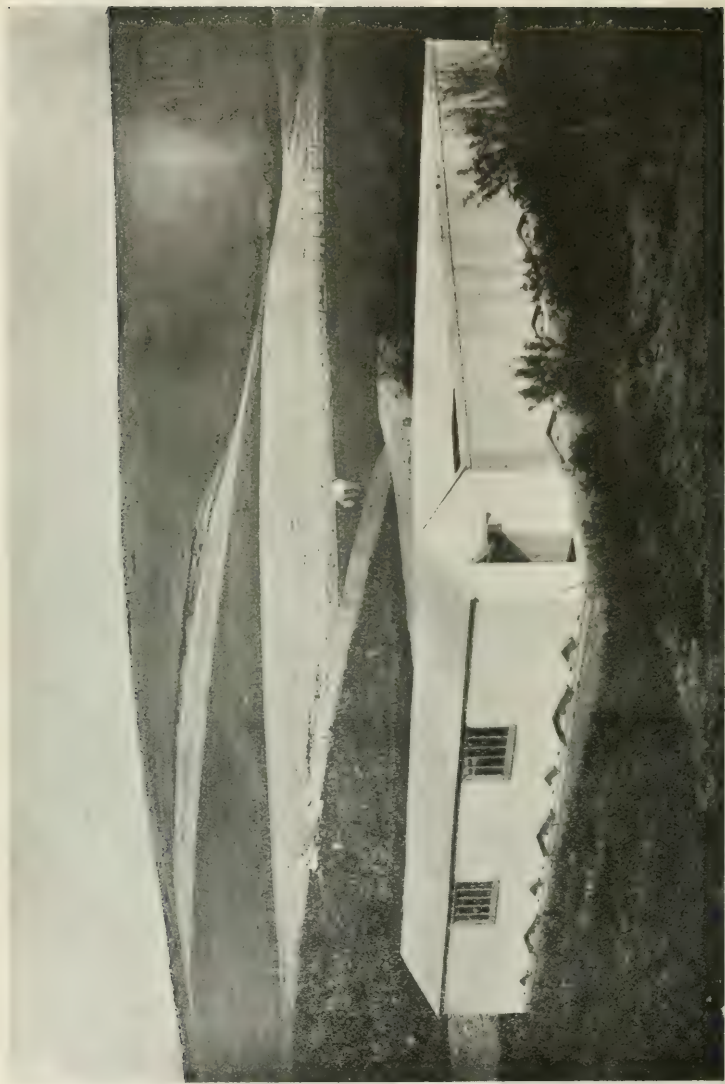
for the bees to winter on, with a passage communicating over all frames, otherwise insufficient stores may be allowed, and the bees at once realizing the situation, will not expand the brood nest rapidly in Spring ; or they may even die out before the owner has a chance to add more food.

Unite Stocks of doubtful Strength.

As mentioned elsewhere, all weak colonies must be united before feeding takes place ; and not simply weak lots, but others about which there is the slightest doubt as to them coming through all right. The reader will ask : "How are those others constituted about which there can be any doubt, other than really weak stocks ?" In the first place I should say those which have old, or otherwise unsatisfactory queens ; those which through any oversight may have been without a laying queen for a few weeks during the latter part of the summer ; as well as those which may be short of stores. It will be found impossible to alternate the combs with ten or eleven-frame hives where they are populous, and in that case place the whole hive upon another near to it ; or if a little too far apart, bring each hive half-way ; and in all cases of uniting, place a wide board from the ground to the flight board, not only to attract the flying bees, but also that both lots may be aware of a strange location, and so have no inclination to fight. (Refer to Uniting)

What is a Strong Stock ?

Will be a frequent question. Can I explain the situation fully ? I will endeavour to do so for the benefit of the



The Covered Apiary.

From a Photo.

many who never seem to realize that 'Unity is strength,' and that nothing less than the most intense power, as exhibited in the almost hurricane strength of profitable colonies, will ever bring them a reliable income year after year.

You want for the production of honey just that strength of numbers which turns the ordinary gentle workers into ever suspicious defenders of their home, ready to assail, if need be, any intruder who disturbs them without due precautions! You want during the summer that teeming hive which all day long shows you such a continual stream going and coming, that the tiny insects appear almost thicker than hailstones! You want, after the removal of the surplus receptacles, a hive of ten or twelve frames so over-crowded that great lumps of clustering bees hang outside until really cold nights compel them to crowd inside! This of course, will not be so noticeable in the Conqueror hive, with its chamber under the stock and the well ventilated space around.

Do you want honey? Honey by the hundredweight and by the ton? Then again read, and re-read the commencement of this chapter, and let the autumn not pass without a general renovation and uniting of poor colonies. Pray do not cling to those miserable weaklings, fearing you are sacrificing all hope of future *increase*. Ah! that is just the word; in the completion of that last sentence is found the whole trouble. How many there are who cannot bring themselves to 'close down' their scattered forces, and so make their chances of wintering almost certain, and positively securing stocks which will give six times the increase (if required) that any three weakly lots would, even supposing the latter will all winter safely.

So far as food and strength are concerned, we are now ready for

WINTER,

and the next thing to be considered is whether or not more warmth, in the shape of packing, is required. The late Mr. Raitt, a Scottish bee-keeper, once said that the best packing for bees in the winter is "bees," and I quite agree with him ; in fact, I use nothing more about my hives than they have had in summer, and at all times consider that the most vital point is the top of the hive, where they are always covered with warm material, such as chaff, or cork-packed trays, pieces of carpet, or sacking.

It is not important whether there are chaff-packed dummies on the outsides of the brood nest, or not ; though of the two I give the preference to

Tough Old Combs.

A correspondent once wrote to me saying that in accordance with the advice of a certain *Bee Journal*, he was renewing his stock combs about each other year. Such teaching is amazing ; and such practice nothing short of suicidal. Why, the poor man was throwing away with his left hand what his right hand gave him. Show me a colony wintering on tough, dark, well matured combs, and I will show you a colony which is coming out well, if only it has fair average treatment. That stock is so well protected by those sound warm combs, that the bees consume less food in maintaining the necessary animal heat ; they need little other protection as a matter of fact ; they will breed early and constantly ; indeed, you can hardly open the hive at any time from Autumn to Spring without finding breeding going on to some extent ; consequently sound old combs must be looked upon as a mine of wealth, which only the most reckless bee-keeper would think of destroying.

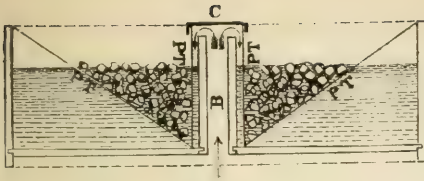


FIG. 31.

Sectional View of Simmins' Self-acting Syrup Feeders. (Non-cooking or cold water process.)

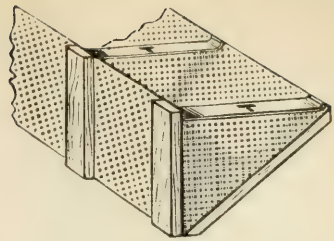


FIG. 32.

View of the Perforated Strainer for holding sugar.

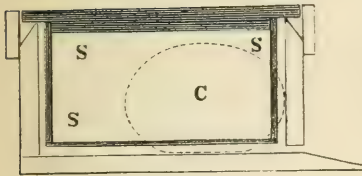


FIG. 33.

Standard Frame, shewing position of stores and cluster at fore-part of winter.

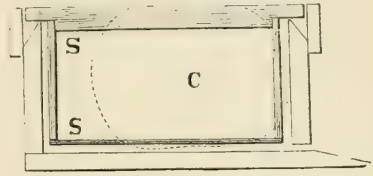


FIG. 34.

Ditto at approach of spring.

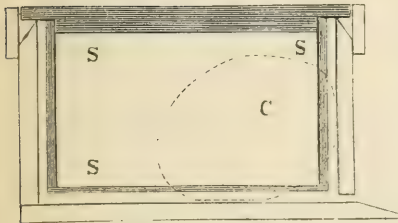


FIG. 35.

Commercial Standard, shewing position of stores and cluster at fore-part of winter.

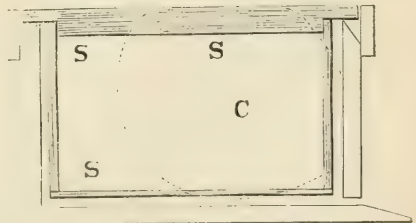


FIG. 36.

Ditto at approach of spring.

Here is Another Picture.

Just look at the stock on nearly new combs, and the totally different state they present. They may be the stronger lot in Autumn ; but now watch how rapidly their stores disappear, there is little or no breeding through the cool season, and in Spring no great energy is displayed in that direction until the other hive is almost ready to swarm, and yet the latter still has the larger reserve of stores. Can any sane man question which is going to be the more profitable colony ?

Large Combs.

There is another very important matter to be re-considered where honey-production as a profitable pursuit on a commercial scale is to be carried out. No bee-keeper dare neglect the advantages offered by large combs in the stock chamber if he is looking for a reliable source of revenue year after year. This desirable consummation of many a bee-keeper's hopes has time after time been utterly unattainable, because of the simple fact that the hive used, more often than his own management, has been quite unsuited to the object in view. The larger comb-surface of the Commercial frame affords

Greater Security in Winter,

from the fact that the combs are better filled because of the more prosperous condition of the colony at all times, while a larger stored surface is within reach of the winter cluster, and early Spring breeding is more regular.

Yet Another Point

of the greatest value, is the kind of stock the apiarist keeps. A colony of bees that winter well, will usually do well all the time. Consequently these should be bred from as far as possible for securing queens to preside over

all hives in the apiary. Whether they be hybrids, or some special strain of any pure variety bred up to a high standard of excellence, no pains should be spared in perpetuating these good qualities.

Position of Frames.

All hives should stand so that the frames are "end on" to the south wall, that every seam of bees is warmed up during each gleam of winter sunshine, enabling them to change their position and take food, while bringing stores nearer the cluster. Bees will winter all right if so situated and in good heart, but where placed behind thick walls in hives, as generally constructed, they are subject to a continued low temperature, as the mid-winter sun does not penetrate to the cluster. There is no warmth in such double walls at this time, just when it is most required, though of course I admit that they are a benefit as soon as the cluster expands, retaining the heat given out by the bees; but this does not compensate for the greater disadvantage in mid-winter as before mentioned.

Mr. Abbott, when editor of the *British Bee Journal*, was quite aware of the immense advantage of admitting the sun's rays during winter, and recommended that a piece of glass be let into the outer wall of double-sided hives. However, double-packed walls to stock hives seldom pay for the extra expense as compared with single walls, and besides being more cumbersome, are a positive nuisance during the heat of summer, when shade is required as offered in the Conqueror Hive, rather than additional heat. For as a matter of fact packed walls cannot be cool in summer, as the advocates of the same would have us believe. Why the more frequent swarming complained of with these? and are we not told that more warmth is given in winter? how much more then, *in excess*, in summer.

Packed Walls to Supers

are a different thing, and just where the heat is most needed, not only to attract the bees to start comb-building, but to keep them constantly producing wax. The rule is to provide flimsy walls to the super crates or none at all in most cases where racks only are adopted. Here is a strange contradiction in the practice of the majority ; and yet it is well known that heat—the constant reservation of heat—will always bring the best work in the supers.

One thing of the utmost importance to which I have often had occasion to call attention, is the

Space below the Frames.

The regulation distance of $\frac{3}{8}$ -inch is certainly allowed between the bottom rail of the frame and the floor of the hive when first made, but this is not enough, as the exposure causes the side walls to shrink fully one-fourth of an inch. This makes it quite inconvenient and disagreeable in replacing frames, as well as where hives are tiered up ; and though $\frac{5}{8}$ -inch clear may not work quite well between upper storeys at first, it will soon come right by shrinkage when anything like 9-inch stuff is used, though it may be considered that the wood has been already well seasoned. Now the $\frac{3}{8}$ -inch space is not sufficient for winter, and where a lower rim cannot be added to the hive, a circular hole should be cut in the centre of the floor board, about 2 inches in diameter, which will greatly assist ventilation, while providing the inmates with a ready means of disposing of their refuse, dead bees, etc. Failing either of the foregoing, the frames can be raised by placing $\frac{3}{4}$ -inch strips under the projecting ears. My pamphlet of 1886 on Prevention of Swarming, explained how the non-swarmer chamber was left all the winter under the stock with good results.

Dysentery and other ills are brought on by the too common neglect of this matter, dead bees drop to the floor and clog the shallow space under the frames, then getting into a mass ventilation is impeded, and when a fine day does occur the bees have enough to do to find the entrance, while the dead and rubbish remain untouched, only to be added to during the next cold spell. Insufficient ventilation and foul matter now begin to tell upon the constitution of the population, and there is little chance that the stock will ever be of much use unless it has immediate attention, as many of the bees are now unable to fly when warm days do offer them a chance ; particularly is this the case where the frames run across the entrance with double walls. With single walls and the frames end on to the entrance the bees are not so liable to be blocked in.

Covering above Frames.

Much uncertainty exists among novices as to whether the frames should be covered with porous or non-porous material ; but, dear reader, it is just this : if you use porous material above your winter cluster, an entrance not more than three inches in width should be allowed ; if a non-porous covering such as American oilcloth be used next above the frames (of course with warm material above that), then a wider entrance must be provided according to the strength of the colony.

Wintering with no Quilts

above the frames may be supposed by my readers to be something unheard of, and yet some of my best stocks have been wintered in that manner, with a 6-inch entrance. The bees, of course, had tough combs to cluster in, and by the spring were breeding merrily ; in fact, they had larger patches of brood than some others covered up

snugly. The large entrance no doubt caused immediate activity when any sunny spell occurred, while those stocks behind double walls, or having smaller entrances, were not so readily aroused to make the most of their opportunities.

Small Entrances Detrimental.

I had two other hives in a bee house with very large entrances facing a constant westerly wind. Upon examination in spring, these showed three and five combs respectively occupied by brood. The entrance was then considerably reduced when the bees began to contract the extent of the brood nests. Evidently a free opening to the outer air is an item of the first necessity, checking any undue inclination to fly, while at the same time allowing rapid flight when the temperature is suitable. The position I have taken up in regard to

Plenty of Air both in Summer and Winter

in connection with large hives and frames, is confirmed in a very decided manner by an experience related by Mr. Chas. Dadant, in the *American Bee Journal* of December 26th, 1895. This champion of large hives, and the largest frame in use (the Quinby), states that a beekeeper he once visited "had five or six hives in a covered apiary facing south. Those hives were placed upon strips made of one-inch timber, two inches wide, and nailed edgewise on stakes driven into the ground, so as to form a sort of rack. The hives had no bottom boards, for our friend thought that bees succeeded best when they had plenty of air. . . . Strange to say, colonies in these hives wintered successfully, and we were very much astonished, in one of the hardest winters, to find that he had not lost a single colony, while our losses had been heavy."

I can assure Mr. Dadant there is nothing at all strange about the bees doing well with no floor boards. For many years past I have been trying to get bee-keepers to adopt an empty chamber under the actual stock, both summer and winter. The reports that come in show conclusively that the deep space under the stock is the only means of keeping the hive cool in summer, and thoroughly dry all winter without the least draught through the cluster, which actually hangs in a dense mass below the combs during the severest weather. Thus

A perfect Winter Arrangement

of the combs is secured in the manner already shown with reference to the description of the Conqueror hive, which with its 6 to 10 inches below the stock hive offers every possible advantage in respect of disposing of the whole of the calamities previously mentioned as to bad ventilation.

Where bees are wintered on Standard frames in long hives, whether the brood nest is placed at the back or front of the hive, the dummy next the open space must stand *clear of the side walls*, just as the frame does. Those who have followed the advice sometimes given, to the effect that such dummy must be tight fitting and have an entrance of only two inches or less cut out of the bottom edge, will have reason to appreciate the loose fitting board.

When keeping bees in a loft, Mr. Cowan, the present editor of the *British Bee Journal*, raised the crown board of his hives with small pieces of wood, such as match ends, as well as giving the same space between the floor and body of the hive. Perfect ventilation was in this manner secured without draught, being in a large closed space; but the same plan could not be thought of with hives standing in the open.

Really there is nothing to be done to the bees during

the winter months, and all the foregoing provisions have to be settled before the cold weather arrives. Cold, with judicious ventilation, and clear space under the frames, a good cover, plenty of stores, and stocks in good heart, can do no harm.

Hibernating as applied to Bees.

Do bees hibernate? certainly they do. Perhaps not in the same way that we are accustomed to view the torpid state of the dormouse, the squirrel, or that more voracious animal the bear. While the little brown fellows lay up a store to which they may repair at periodical awakenings, the flesh-eating monster stuffs to repletion and piles up layers of fat on his bones till his shaggy coat will hold no more. He seeks a retreat with the drowsiness of gluttony already perhaps creeping upon him; and then whether dead or alive for weeks he knows not, until it may be fitful dreams preceding a final awakening, cause him to realise that his bones are nearly bare, and his once sleek and tightened coat now folds loosely over his ungainly carcase, the result of nature's long-continued, if niggardly draughts upon the stored fuel, that just a bare flame of life may be maintained during his dormant state.

How like all this is to the conditions governing the hive bees. These have their period of preparation; their term of low vitality; their occasional break in the monotony of rest; and finally a glorious awakening to all the beauteous gifts of light and life. The only thing different being that whereas the quadruped sleeps—a sleep almost like unto death, the insect may be said simply to “rest”; and in that she is thus free from labour and from any exciting cause whatever, there is then no need for an undue exertion of the digestive organs; food is partaken of less frequently, and the numerous members of the

winter nest, but more especially those farthest from the centre of the cluster, are very slow to awake to a consciousness of any change in their surroundings.

It may almost be said that the bees take turns in hibernating, as the centre of the throng, like the pulsating heart of a single being, maintains a blood-heat temperature without which the marginal units would soon become extinct.

Hibernating is the Essence of Economy;

economy in food—economy in vital force and energy—a saving of life to the bees and of money to the owner, at a time when flights abroad would mean instant death to the individual members of the community, which only exists as a whole, through the combined heat of the clustering, compact mass of units.

Excitement

on the other hand—even the simple excitement of muscular action—means the consumption of stores beyond normal requirements; and consumption means a corresponding waste of energy, which in Autumn and Winter should be avoided as far as possible, because at that period there is no compensation—no profit to balance the waste.

The Winter Season.

On some cold morning just take a peep under the quilt at the bees of your strongest stock. Be as quiet as you can, dare hardly to breath, and jar nothing near the hive. Well if you have not made such an examination at any other period of cold, you will be almost startled into wondering where your bees have gone to. What a mere handful compared with the rousing populous colony you knew to be there when you left them snug and well stored for winter! It seems hardly possible such a vast host can so contract themselves that a gallon measure will more

than hold a population you imagined would fill at least half-a-bushel.

The bee nest at this season is practically its own life preserver, and what heat there is present is only to be found towards the centre of this compact mass of bees. The hive itself acts as a shelter, preserving them from the direct influence of the cold winds and wet, while the temperature around the walls (inside) of the hive is but little higher than that on the outside. The only change that takes place, and that a highly beneficial one, is when during a spell of sunshine the interior of a thin walled hive rapidly rises in temperature ; the bees quickly responding to this genial warmth, immediately expand their cluster, while many set about bringing the distant honey to be re-stored in the cells adjoining their winter nest. This is done in such a systematic manner that the extreme outer combs are first relieved of their contents, while the whole outer face is cleared before the other, nearer, side is touched.

It has been declared that the temperature on the inside of the hive walls stands at 80° to 90° during winter. There was never a greater mistake ; as we have already seen it cannot possibly be much higher than the outside air, and such a high temperature is only to be found at the centre of the cluster. Bees not only chill to death, when in small numbers near any wall where the mass of the bees do not cluster, but can not maintain life if separated by only a single comb from the actual bee nest. A high temperature can only be registered after the bees have been disturbed, or by withdrawing a previously arranged thermometer from the heart of the cluster.

Disturbing Influences.

The act of breeding which re-commences in normal

colonies about mid-winter at the centre of the cluster, is not in itself a disturbing influence, for as yet its extent is never developed beyond the means at hand for its moderate continuance. But when the owner begins unduly to feed candy, and meal added thereto, then the elements of additional unnecessary excitement are immediately apparent in a large death rate caused by the premature flight of the workers in search of large quantities of water. The cluster expands unnaturally and thereafter a serious drain is made upon the vitality of the bees in keeping up a higher temperature generally.

It is far more profitable to leave natural conditions undisturbed until spring fairly opens, when the first balmy day which permits of a large ingathering of natural pollen will see the last of the hibernating cluster, and then judicious feeding will carry forward a rapidly advancing condition of progress.

Queenlessness.

A colony losing its queen before or during winter, will seldom hibernate perfectly, unless they are fortunate enough to have a small patch of eggs left by her from which they raise another though of course a useless queen. The only drawback then is the loss of time before another queen can be supplied to recuperate the population. With no possibility of rearing a substitute, the bees though overcoming the first stage of extreme excitement, can not rest naturally, and the consequence is the stores are rapidly consumed, and even if dysentery does not intervene the bees are scarcely worth uniting to another stock by the time suitable weather for such operations arrives. I frequently leave late virgin queens with stocks when failing to mate in autumn, and unite during the following February or March to some other hive with a fertile queen, the stock hibernating perfectly meanwhile.

Insufficient Stores.

This really unnecessary condition is unfortunately too frequently allowed ; and is a serious impediment to successful hibernating. The bees fully realize their beggarly condition, and during the coldest weather may often be heard mournfully roaring while other more fortunate stocks are perfectly quiet. Candy, as I have always pointed out, if supplied, is only a further evil, but the addition of good sealed stores, inserted in the centre of the cluster, or placed flat on the frames, in an emergency, will always bring about the necessary restful condition once more.

SPRING.

About the 21st December the queens will begin to deposit eggs ; in due time the young will hatch out, and slowly the brood nest is enlarged, until by the time the older bees begin foraging, the consequent heavy losses are fully compensated by those brought to life while outside all appeared quiet.

The production of young bees at this early date is not always without intermission ; cold in itself never hinders it, as the brood is at the very heart of the cluster, but if unable to obtain water for many days together brood rearing ceases, only to be renewed as soon as the workers can get abroad. Pollen is as a rule always present in well-stored stock combs, and when this comes in freely (March to April), all fresh from the fields, the brood nest is rapidly extended. Now is the time to see that the bees have more than sufficient food to keep them going. With a good queen it can hardly happen that the combs will be too heavily charged with honey at this season, but by taking the outside combs, one at a time, and inserting them in the centre of the brood nest after the cappings are first bruised, great progress will be made. One such comb as

yet at an interval of seven or ten days, as needed, will keep the bees and queen busy, and by May 1st, the whole ten or more combs should be one mass of brood, and the hive so crowded with bees that another set of combs will be required *below* the stock hive. If one has no combs on hand, then use sheets of foundation, alternating them with the combs of brood throughout both storeys, and see that the older brood goes below, with the pollen combs near the outside. In any case feed carefully, until honey comes in freely, as such a large population is liable to be rendered perfectly useless by the loss of the brood, by the slightest neglect at this time.

Avoid all Candy

if possible, until April or May, when the hives becoming crowded with young bees, it will be quite safe, and will act as a powerful stimulant both towards comb-building and the rapid extension of the brood nest.

If syrup must be used, give a pint or two rapidly at first, then feed slowly from a half to one pint daily, according to the strength of the stock.

Never! Oh Never!!

start feeding with combs just filled with dripping syrup. This, and too early candy feeding, will destroy the original members of the colony by excessive excitement, long before a new population can be reared to take their place.

Until Warm Weather

and a mass of new pollen are in evidence, allow stocks to rest; then, where you have good queens, they will soon bring the stocks up to a prosperous and profitable condition.

All fair weather in early spring is not necessary for securing the best results. Certainly frost and snow after the opening of spring-like weather are not to be preferred,

but a constant period of fine and mild days will the sooner wear out the older bees ; while the dull days are a cause of rest and recuperation, if other conditions internally are correct for continued progress.

One often hears of beekeepers regretting that a sudden cold snap has checked brood development and caused a lot of chilled brood to be thrown out of the hives, and yet, after once developing a brood nest, a stock properly adjusted and fed, will take no notice of sudden frost or snow, and will continue its progressive state in spite of the elements.

A great many beekeepers are troubled with

Spring Dwindling,

so called, because after making exertions to develop the brood nest, the bees rapidly decrease in numbers instead of continuing a progressive state of increase. This is almost entirely due to the owner's own mismanagement, or miscalculations.

The Causes of Dwindling

may be the retention of old queens ; bad ventilation and consequent dampness in winter ; insufficient food causing a feeling of poverty ; yes, and even an excess of food where no effort is made at the right time to convert it into life and force.

Feeding during winter, and more particularly with Candy, between October and February, inclusive ; as well as stimulating the bees to breed too late in Autumn, or too early in Spring, should all be avoided where one hopes to push forward with the greatest rapidity when warmer weather is approaching.

The Golden Rule

in stimulative feeding must never be lost sight of ; it is this :—" Do not commence until all conditions are

favorably combined for the rapid development of the brood nest, from the first moment you decide to break up the semi-hibernating condition of the winter cluster." See "Plumping"; also "Feeding and Feeders."

Where stocks cannot be got up to the desired strength for the opening of the

SUMMER

season, or when one wishes to take every possible advantage of the harvest, he will not hesitate to work on

the Doubling System.

At this moment honey may be coming in rapidly, with every appearance of fine weather to continue. The first is always the best chance, and it is a question whether the apiarist will simply allow the bees to waste their energies in excessive brood rearing, or at once cut short their work in that direction, and direct far greater power towards the "piling up" of stores. What is done must now be done quickly, and though the usual plan has been to simply place the brood combs of one stock with, or upon its neighbour, and saving the queen with the swarm remaining on the old stand, the following definite methods of proceeding will give the highest profitable results. For producing

Comb Honey,

select any two desirable stocks standing near to each other. Unite the entire force of workers on to eleven frames of the most completely packed combs of brood; allow the non-swarving chamber under, and put on supers already filled with prepared comb to the capacity of some 40lbs., or even more. If the other queen is old, destroy her, otherwise reserve her majesty in a nucleus. The surplus

combs can be placed above any pair doubled for securing

Extracted Honey.

In this case, after removing one queen, place one hive bodily upon the other, having first arranged the non-swarmer chamber below all. Thus we have three chambers teeming with life, but at least one other must be added above with empty combs, or odd brood combs that may be left over from stocks united for surplus comb honey. If foundation must be used in the absence of sufficient combs to fill further chambers, then it will be better to alternate frames of comb and foundation, to secure the more rapid completion of the latter.

Where extracted honey is to be largely worked for,

Surplus Brood Combs

are the most valuable stock-in-trade the bee-keeper can have, if he only takes care when out of use to keep them in a dry store with free ventilation, and all vermin excluded.

A Great Evil

noticeable in nearly all apiaries is the absence of any attempt to keep on hand a supply of surplus hives. In calling attention to this I have no intention whatever of seeking accommodation for swarms, but have in mind the best means of restraining them, and making far more profitable use of the ever swelling numbers in the mother hive.

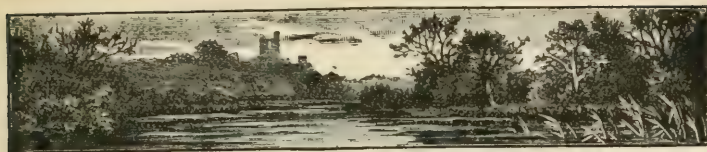
What reasonable man can for a moment imagine he is to secure large results from the one brood chamber which still constitutes the rule in Modern (?) Bee-keeping? and this often with a fixed hinged cover as well as permanent legs, which the owner does not conceive the idea of removing!

A hive which does not permit of rapid extension either

above or below the original brood chamber, by the seasonable addition of other like chambers always held in stock, is one more suitable for fire-wood than progressive bee-culture.

Further detailed management for the Summer season will be found fully explained in the following pages, where separate chapters are devoted to the various necessary proceedings.





CHAPTER XIII.

THE ART OF PLUMPING ;

OR, RAPID INCREASE IN SPRING.

A NEW term applied in bee-culture by my pamphlet of March, 1894, was that of "Plumping," a process whereby one or more colonies of bees can be supplied at once with a large complement of brood in spring; nuclei can be helped during the summer, or backward stocks strengthened when autumn arrives.

It may surprise my readers to know that the most prolific queen ever reared can be worn out in six months.

How is it Done ?

As soon as natural pollen comes in freely, a stock is carefully arranged so that it completely crowds three combs. Two of the combs have plenty of young hatching from large patches of brood, while the central frame has a part or whole sheet of foundation, or a guide only if it be early in the season.

This central comb is built out so rapidly that every two or three days it can be removed, with eggs in every cell,

each time being replaced by another frame with a guide to be built out in like manner.

But the more important item to consider is the

Special Plan of Feeding,

which is not allowed to fail at any time while honey is not coming in. Slow-feeding as generally practised, is of no avail in producing the largest quantity of brood. In times of scarcity constant and *heavy* stimulative feeding is the only course that can be adopted for this purpose, and that I have found can be carried out only by a *combination* of dry sugar or candy feeding, and a rapid supply of syrup. That is, the dry feeder at one side, a frame syrup feeder on the other side—both acting as the dummies on either side of the three crowded combs.

This combined process is the only one that can be made the means of forcing the *largest* amount of brood in early spring, and yet hitherto fast feeding has been condemned, because it has been considered that the bees will then fill up everything with food to the exclusion of brood. With ordinary colonies this is often so; but following the times, bee-keepers have become too closely wedded to the modern practice of using full combs, or sheets of foundation in the stock chamber. Their minds do not travel back to the possibility of making bees build their own combs to far greater advantage, and frequently more profit, without the expense of foundation.

In Spring

therefore, to enable one to get the greatest advantage in brood production, I put in a guide only to the central frame, when by feeding as already shewn, the result is astonishing. The queen occupies each cell as the work proceeds, and there being no part thereof occupied by

old stores or pollen, each of these new combs will be productive of more brood than two combs partly occupied by stores at this season. Indeed, in early spring the old stores, particularly of pollen, are the greatest impediment to the rapid extension of the brood nest. By all means keep such stores in the hive, but unless intersected by new combs a stock cannot be pushed on with rapidity towards the swarming point. During autumn and winter, tough warm combs are a necessity, but as soon as mild weather approaches, and the bees again expand, clean new combs are a convenient medium for producing the greatest possible numbers; but these combs must be constructed while the queen is following with eggs close behind the workers.

The general principles of rapid brood production are now before the readers; but we want the best results without the usual stimulation of *all* stocks, which does not always bring on the happy results expected. Under

The New Process

the object is to prevent this general stimulation, and additional loss of life ensuing thereafter. The great thing is to "Plump," or fill up each stock in rotation, with all the brood it can care for (according to the season) *at one operation*, beginning on the strongest, and so on down to the weakest in rotation; otherwise disturbing none, and feeding none until so "plumped." That is another Golden Rule in feeding operations; always leave the weaker colonies alone until the stronger can help them by brood, and perhaps some sealed stores.

As the Season Advances,

and there may be some danger of drone cells being built in the central frame of those hives being drawn upon by

“Plumping,” there are several ways of securing all worker combs. First by shifting the hive to a new stand, and so getting rid of the older workers, making a nucleus of them. This is almost better than giving a young queen, as

Young bees may always be relied upon

to produce only worker combs, no matter what age the queen is. Otherwise full sheets of foundation may be given as fast as others are filled with eggs. Old combs will never give the same amount of brood, as so many cells are immediately filled with food ; but while comb-building is the order of the day, the queen is also under a greater stimulus to do her best.

Where several stocks are forced for comb-building and brood production each stock that is “Plumped” in rotation may be given a full complement of brood within a few days. The bees that are present on the first return of spring are usually half gone before a good brood nest is developed. By the new process the brood nest is extended before many of the old bees fly in earnest. It must be remembered that

Brood Makes Brood ;

and therefore, the forced lots, rearing the brood for “Plumping” other colonies must always retain the two combs of brood at either side of the new comb being built : the work must not begin until the two combs can be secured with hatching brood, and, moreover, the desired process of rapid work is always most satisfactory when only the three frames in all are used.

Alternative Operations.

One or other of the first selected brood combs may become overloaded with store. In that case an occasional

new comb of brood is left to mature, and as the remaining brood hatches from the clogged comb, the latter is placed behind the dummy, as a substantial reserve for the bees to appreciate, as they certainly will.

As the forced or Plumping stocks develop towards summer some of the syrup may be left off, and the dry feeder or candy will be the main stay, until bees are gathering natural stores. By beginning first to "Plump" the strongest, the weaker lots come in for "hatching" brood before they need be stimulated at all.

Producing Worker Combs Without Foundation.

A method of producing new and straight worker combs without foundation was mentioned in the earlier editions of this work, especially as regards utilising strong nuclei during the summer for this purpose.





CHAPTER XIV.

SWARMING—ITS CAUSE, ITS CONTROL AND PREVENTION.

SWARMING is undoubtedly one of the greatest hindrances to honey production; it is in fact a stumbling-block with a vast number of beekeepers, who lose the best part of the season before the bees can get into the supers which had been left in an unfinished state when the swarm issued. Even under such conditions, however, the act of swarming should be so controlled that work is not hindered. But here again the average owner appears to prefer increase to consolidating his working force.

The primary cause of swarming is to be found in the completion and over-crowding of the brood-nest. How can this be proved? (1) Very small skeps are productive numerous swarms. (2) The ordinary ten-frame Stan-

dard hive which accommodates more than double the contents of such skeps, seldom throws off more than two swarms when working for comb honey. (3) But when extracted honey is to be secured, so many more combs can be given than are occupied with brood, that swarming is of even less frequent occurrence. (4) Going still further, where very much larger frames of comb than the Association Standard are used in the stock chamber (such as will absorb the contents of three or four skeps), yet a smaller percentage of swarms will be found to come out. (5) Where bees take up their abode in the walls of old houses, under the weather boards or tiles, the combs are often so long (I have found them three feet in length) that the queen is not crowded, and the brood nest is, as it were, never complete. Under these conditions a swarm is seldom known to issue; indeed I have not heard of one from the many stocks of this kind that have come under my notice.

Following up this process of reasoning, and after experimenting in various directions, I have found the most effective means of prevention to be that of providing a secondary-chamber, under the stock, and which is never filled with finished combs. This arrangement, as regarding ordinary hives in connection with other essential features hereafter explained, constitutes the only method that can be founded upon those natural principles which govern the actions of the inmates of the hives.

Simmins' Non-Swarming System.

This method of management was first made public by the exhibition of my Special Prize hive in 1878 at South Kensington, and later by the issue of my pamphlet on the subject in February, 1886. An immense interest was created at the time, and many copies of the

work were distributed in America by the late T. G. Newman, then editor of the *American Bee Journal*; while large sales were effected in this and other countries.

In that work I claimed that "*No colony in normal condition attempts to swarm unless it has all its brood combs completed*:" and further: "To reduce the matter to a greater certainty, while admitting that bees may sometimes swarm if such space and incomplete *brood* combs happen to be situated at the back, or the point farthest from the entrance, the author *insists that the open space and unfinished combs shall always be at the front, or adjoining the entrance.*" That is, at the front where long hives are used; or between (*and under*) the brood nest and entrance where hives are tiered up one above the other; the latter plan always being the more satisfactory for general working; and as now perfected in the Conqueror hive.

The idea has long been fixed

in the minds of bee-keepers that unless the bees were *crowded* into the supers, and overcrowded in the stock chamber, nothing would induce them to work in these supers or surplus receptacles. The same idea remains to-day, fixed as ever in the non-progressive minds of the majority of teachers, and of a vast multitude of others who will probably wait, to make room for more enlightened successors before the grand idea of surplus unoccupied space, in addition to surplus comb-building capacity becomes generally acknowledged as one of the first principles in the production of large yields of honey.

An Important Item

in the new management consists in supplying every section with worked-out combs, and those prepared just

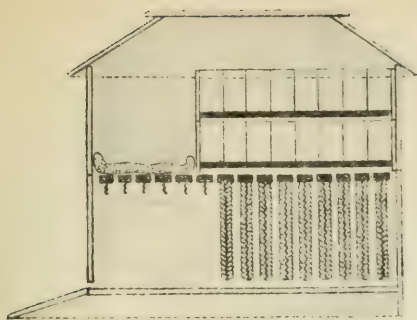


FIG. 37.
Non-swarming Plan, as adapted to old style
Long Hives.

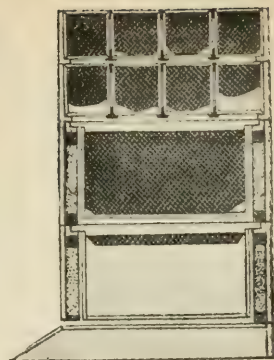


FIG. 38.
Non-swarming Plan, adapted to old style
Tiering Hives.

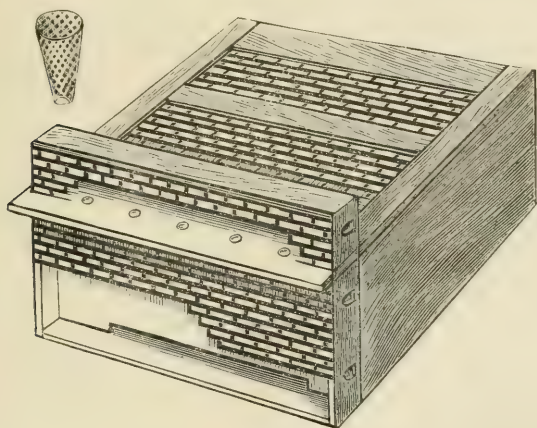


FIG. 39.
Swarm Catcher.

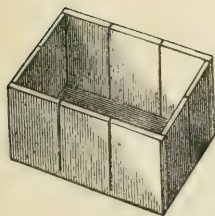


FIG. 40.
Foundation, or Comb Cutting Box.

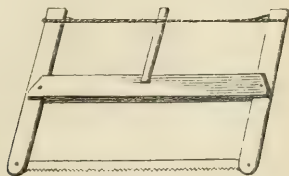


FIG. 41.
Foundation, or Comb Cutting Saw.

prior to the current honey season, so that the bees are induced to store above rather than build to any extent either in front or below according to the style of the hive in use.

If through any inattention to the supers, or a sudden influx of honey, the bees have no room above, no time is lost, and they can go on building below. Nevertheless, these frames with starters must never be allowed to have finished combs, and should any be nearing completion they are to be cut out to be used in the sections, first extracting the honey, if any, and exposing for two or three days those which may contain eggs, that they may be removed by the bees when such combs are returned.

Causes of Failure.

So many questions are put forward by those who fail to prevent swarming that without enumerating all, I will refer to the main points and endeavour to make the matter clear to my correspondents. I do not propose that all the benefits which may be derived from my system are to be attained by simply using the Conqueror, and then just leaving everything without further control.

The principal causes of failure generally brought to light, after examination, prove to be—(1) Want of sufficient ventilation. (2) Using excluder zinc between the stock and super. (3) Not starting the supers with prepared combs. (4) Not removing the surplus as ready, and so failing to keep the bees at work in the right direction. (5) Not using the new combs when started below the stock for super work. (6) The failure to keep young and vigorous queens. (7) Stocks too backward to start early work.

Taking in detail the points thus enumerated—

(1) "WANT OF SUFFICIENT VENTILATION." With a

strong colony in full swing during favourable weather, the entrance should be fully open, and if necessary, the cover raised. I cannot imagine a well found colony with a young queen attempting to swarm from the four extracting chambers of the Conqueror when thus ventilated, or from the comb-honey chambers as presently mentioned.

(2) "USING EXCLUDER ZINC." This is an impediment from my point of view, and has much to do with preventing the bees working in the supers and so bringing on a desire to swarm by over-crowding the stock combs. I have always insisted upon the rule that the best queen-excluder is the early and powerful colony ; and with such the queen has no chance to rear an excess of, or mis-placed brood when honey is to be found. This assertion finds ready support from prominent writers.

Nos. 3, 4, and 5 are all related to each other in the order given, and tend to cramp the bees for storage room where most wanted, at the very time the owner should be prepared with all the available cells for storage.

I also find that 6 and 7 are very closely connected. Young queens or the stocks possessing them are less inclined to swarm ; generally winter satisfactorily and start off in very good condition in the spring. I repeat it is the backward and not the powerful early stocks, which give the most trouble in swarming, and if as usually happens the late colony has an old queen, and comes into full condition about the middle of the honey flow, nothing will prevent the issue of a swarm, unless the queen and all cells but one are destroyed. On the other hand the forward stock with a young queen begins to store from the first, and with the advantages offered by the above hive, there is seldom any inclination to leave work just for the pleasure of swarming.

The Working of New Combs

with the author's hanging-chamber hives is now more satisfactory, while the cutting of them for fitting into sections can be entirely avoided by the use of his completely divided sections and section holders, as provided in the original Conqueror hive, class C, illustrated on page 149.

When it is desired to draw out the foundation before placing the divided halves in position, a sheet is attached to one side of each *alternate* half of the section frames; or, in other words, only one-half of the sectional parts required, being furnished with foundation attached to the inner side, a shallow chamber is filled up with them, and placed next above the stock chamber as early as the bees can possibly be induced, by warmth and careful feeding, to work out the foundation rapidly. Any kind of hot water vessel placed above, especially at night, where it can be regularly attended to, will induce rapid work, so that three or four days only need elapse before the foundation is sufficiently worked out for removal.

The removed set may be placed above the quilt, and the section halves adjusted as soon as the bees go down, if not shaken off in the first instance. Another set may follow close on the brood nest, and when the season fairly opens these new combs will prove a remarkable stimulus, while the bees will then be strong enough to start other foundation in the lower chamber, used for the time being in place of, or next above, the swarm preventing chamber.

When the section halves are placed upon either side of the newly built combs, simple pressure under a board will fix all securely.

When combs are completed, remove the halved section holders and clear away all odd wax and propolis. Each

set of three sections may be handled as one, or, if preferred, then divide with fine wire.

Let it be borne in mind that

The True Principle of Management

consists in so manipulating the supers that none of the frames or sections arranged below the stock, have finished combs all the season; i.e., they must be removed and used above as fast as the bees make a start thereunder.

The space below and in front of the brood nest gives ample ventilation, keeping the hive cool; and the stock chamber being, as it were, duplicated, but never filled, the desire for swarming does not exist.

As will be seen, the system is particularly applicable to the production of comb-honey, and without doubt is the only process that will prevent the issue of swarms while securing that article. At the same time it makes a greater certainty of prevention while working for extracted honey, though generally in getting the latter article stored no swarming will occur, as there is no object in having the combs well finished, and unlimited room can be given.

Another Important Item,

and one always neglected by those who fail to carry out the process, is that a large entrance be provided during the working season. In the Conqueror Hive the outer entrance is about 18in. by 2in.; and a definite regulation of this entrance decides at any time, whether the bees shall be permitted to work below the stock, by partial closing; or be forced by extra ventilation below, to finish their work farther away from such opening.

Simmins' Non-Swarming Chamber

has been confused with the ancient "Eke" and "Nadir." The eke was a portion of the lower rim of a skep placed

under another similar hive, raising it so that the original combs were then extended *permanently* to within the usual distance of the floor; thus securing additional breeding space in the enlarged combs. No open space was left, and the enlarged combs remained until the stock was finally broken up.

Here was no attempt at prevention, just as there was none in the case of the "Nadir," which was a distinct frameless chamber placed under the original stock, whose combs could not be extended because of an adapting board between the two. This "Nadir" was always given as a surplus chamber, wherein the bees built solid combs of newly gathered honey. Thus in both cases the receptacles were *filled* with comb for the respective purposes, unlike the Author's non-swarming chamber, which is never allowed to become crowded with combs.

This is the first time the long-vexed question of prevention has been reduced to systematic management; but, as usual with anything new, there are not wanting those who claim that there is nothing original in it. The editor of the *British Bee Journal* endeavoured to prove that it had been in use many years since, and that the Stewarton hive was worked upon the same principle; and while attempting to show how to produce comb honey without swarming, I find he could not tell how to work *entirely* for that article with any given colony; but only that a limited quantity could be obtained while at the same time using many combs under the sections as and for extracted honey—a most unsatisfactory process, by which few finished sections can be obtained unless my plan of filling the same with worked-out comb is adopted.

Bee-keepers generally have saved over unfinished combs in sections from year to year, and these were found to give a good start to the bees, but nothing was done to

institute the systematic production of such new white combs for all sections before being placed on the hive until the present system was inaugurated.

All that has ever been given as to the manipulation of the Stewarton hive relates chiefly to the insertion of several swarms into the set of boxes. This does not look like prevention, and moreover, whether with swarms or established stocks the principle did not consist in keeping the same or any empty chamber *always* below the brood nest. In hives 3 feet long it is claimed that in America the plan was tried 30 years since,—the bees in this case working from back to front all on the same level. Here the combs were removed *as completed* at the front.

Just here the Reader will not fail to see the difference—a contrast decidedly in favour of my own plan, which is this: The surplus is worked and continually removed from *above*, while little attention is needed below or in front of the brood combs; as in the first place no combs are there permitted to become completed, and even when extracted honey is the object the same frames may remain in the same place all the season, because with careful attention above little or no comb is built in them, as my own experience has shown.

While many consider that they have no need to prevent the issue of swarms, and can obtain better results by allowing one swarm to each colony, there are many districts where the season is of short duration, and the largest surplus is only obtained by prevention. The system, moreover, should be of advantage to all, enabling increase to be made at the most fitting opportunity; and not, as is too often the case, just as a good honey-flow is on.

My non-swarmling system is illustrated for the better guidance of the Reader. Figs. 5, 12–15, represent the Author's hanging chamber hive. Fig. 37 shows the man-

ner of proceeding where long hives are used, with the empty frames arranged on the same floor, between the brood nest and entrance. Fig. 38 explains the plan adopted when tiering up with the old-style storifying hive, with the lower hive having empty frames. The sectional views exhibit two crates of sections above the brood nest.

The Conqueror Hive

is especially adapted to this method of working, and has stood the test of many years' practical application, as well as adverse criticism from various sources. Its great simplicity of management when understandingly applied, has been its greatest recommendation, and a mass of independent testimony has finally established its reputation as the most rational method that can be adopted for the suppression of swarming, and as a safe guide to the bee-keeper of to-day and of the future.

Other Methods

have been tried for preventing the issue of swarms, since I introduced the term "Non-Swarming System"; but all have come short of the desired object through incorrect application, and a failure to understand the needs of the case; requiring constant attention and more labour than usual; while at each operation, whether in using a double hive with a revolving motion, or shifting the entrance from one chamber to another by other means, the entire economy of the hive was dislocated, to the sure detriment of honey gathering and storage.

The Worked-out Combs for Sections

are obtained by using foundation which runs nine or ten feet to the pound, having a very thin base, otherwise an objectionable mid-rib will be found in the centre of the combs.

All my other methods formerly used are giving place to that now adopted with my halved sections and section holders, which offer a perfect means of obtaining beautifully worked-out combs that can be placed directly into the sections (or rather the halved sections placed upon them) without the trouble of fitting or cutting the foundation in any way.

A sheet of foundation, about 13in. by 4in., is fastened on to the flat side of one of the half-frame section-holders. A number of these are worked out above a strong colony which, if necessary, is carefully fed, and the foundation is soon ready to be placed over other stocks and they will not hesitate to complete the work so begun.

It is a mistake to suppose, as some do, that the foundation will in the first instance be drawn out to fully extended cells. Nothing but disappointment and loss of time would result with such an object in view. A day or two only should be allowed before the partly worked comb is removed and further sheets supplied for the same purpose.

The companion parts of the section holders as well as the halved sections are put together as already shewn under the chapter on 'Foundation.' Slight pressure secures all in place, when a most perfect arrangement is presented.

The gauged cutting box and the frame saw for cutting odd combs to fit into sections as hitherto used are shewn in Figs. 40 and 41. The blade of the saw is of the thinnest possible material, with very fine teeth. These illustrations are from engravings shown in my pamphlet of 1886.

The Double Conqueror

was introduced by the Author in 1894, and while it may be used after the Well's plan, by supering both lots as one, it has this great distinction, that the stock chambers are quite separate, being simply the usual eleven frame

chambers, and the non-swarmling chamber under each. In fact it is arranged as two Conqueror sets, back to back, with a perforated divider between, which unlike that in the Wells' hive, is never stopped up by the bees. But

The Management

of the hive is more comprehensive and results in far heavier yields of honey. On page 242 of my 1893 edition will be found formulated a system of working two stocks to great advantage, without using the revolving hive since offered as the Langham device in the hope of securing the same result, but which plan soon fell into disuse. The method given by me was as follows :

"During a heavy flow of honey, bees will unite anyhow ; therefore select any two colonies standing near together ; unite the whole of the bees and brood into one of the hives (adding a further chamber), excepting such as return to the empty hive with the queen there retained. Give these frames with foundation, or starters only attached to the top bars. This swarm will soon fill up with brood and store.

"But our object is to ensure that this new swarm rears a *continuous supply of brood and bees*. Meanwhile bring it within a foot or so of the now populous hive, which has already received most of its older combs and adhering bees. After four weeks, or as soon as many young are hatching, remove the new swarm quite behind the other, and the latter will again receive all the flying bees. After a day or two shift the denuded hive to the opposite side, always standing a little back, but facing the same way as the more crowded stock.

"By shifting this breeding stock as often as it recovers its active population sufficiently to crowd its queen with

new honey, her hive is always crowded with brood, while the main working colony has a constant renewal of young workers, without the trouble of uniting and changing the surplus receptacles.

"The queen in the main hive has very little room allowed her for breeding, while consequently there is little inclination to swarm."

Well, that is the basis of the Double Conqueror Management, in controlling swarming; but the plan being modified is carried out as follows:

The hive has two entrances both at the back and front. Consequently when the two stocks are strong enough, one is supered, while the other has its late entrance closed, but at the same time its opposite back entrance is opened. This throws all the actual workers into the one supered hive, while the queen of the denuded stock fills up rapidly with brood, having few gatherers to clog the cells with honey.

After some ten days the back entrance is closed, while the back of the populous supered stock is then opened, receiving a further addition of workers. The brooding stock then of course has its original entrance again opened, and so on, repeating the process as long as honey flows.

A single stock may be used in a similar manner, first making up an early nucleus from the stock and placing it in the other side, using the young queen when in full work, for producing the surplus population for its parent hive; or the process may be reversed, using the nucleus when ready as the supering hive. A swarm may also be hived on one side for carrying out the same process of helping a stock in the other; while lastly two swarms may be used for stocking the double Conqueror, and presently helping each other upon the same plan.

Swarm Attachments

for securing swarms, when they issue, were devised by me in the year 1888, and for some years past similar contrivances have been mentioned both in English and foreign journals, though complete satisfaction seems seldom to have been attained by their use.

I still adhere to my non-swarmling plan, or that which helps to restrain bees from the *desire* to swarm, as being by far the more simple and effectual, but as there are many who for various reasons are unable to control swarming, I illustrate the earliest design in Swarm Catchers (Fig. 39), which requires little attention when once in position.

It is simply the arrangement of my usual swarm preventing chamber under the brood nest, with a floor between having a central opening covered with excluder zinc. The whole front of the lower chamber is covered with excluder zinc, set out 1½ in., and reaching up to and covering the front of a porch which comes in front of the main entrance.

The alighting board has here several inverted cones so inserted that the queen failing to make her way out with the swarm finds a passage into the lower chamber from which she cannot return, and where the bulk of the swarm, after vainly seeking her abroad, re-assemble and go on to work. If allowed to continue there they work in connection with the original force ; but, in this case, all surplus queen cells must be cut out, and the zinc removed from the upper entrance that the young queen remaining may leave for her natural purposes.

THE CONTROL OF SWARMING

By Division, and Re-uniting with Young Queens.

Except in the few districts where the season is protracted, increase is obtained at the expense of honey

but in any case it is not desirable to take more than one swarm from the old stock ; and this division to give the best results should be made either before the first honey-flow occurs, providing the colony can be made strong at that time, or during July, when little work is generally being carried on by the bees in most districts. But, that we may allow for uniting in the autumn, it will be safe to reckon only upon 50 per cent. increase, as it is imperative that all be kept in good condition. In the table of estimates this has been placed at a much lower rate, so that there is little fear of the apiarist weakening his stock.

A division of stocks can also be made during any interval of dearth, if not too late in the season, but in any case a young queen should be on hand. The operation of

Dividing

will consist in removing from a strong colony one-half of the brood combs containing mostly hatching brood, with the bees clustering thereon, as well as the queen ; placing these in a new location, with all the brood near the centre of the hive with empty combs or foundation on either side of the same. The brood combs remaining on the old stand are to be alternated with foundation, as the larger number of bees will be here, and on the evening of the third day following, unite with them the nucleus having a young queen, or insert the queen alone if the nucleus is again required. The reason for waiting three days in this case is solely because of the bees returning from the removed portion which may not always be friendly to the queen which they know is not the one they have just left.

Having their own queen, there are not so many bees leave that portion placed in another situation, and possessing the older brood the hive will soon be crowded, when the outside sheets of foundation are to be inserted one or

two at a time in the centre of the brood nest. The number of frames to be allowed for breeding will depend upon the approach or return of the honey-flow, and it may even be necessary to remove some of the least filled with brood, where comb-honey is to be worked for, crowding the bees on to eight or nine of the combs most densely packed with brood. I formerly practised

Contraction

both in summer and winter, but with the institution of my non-swarming system it is found unnecessary either for summer or winter. When increasing, however, it is the only way to make the most of the honey harvest, by thus curtailing the powers of the queen in less populous colonies. Treatment for either comb or extracted honey with divided stocks will be as before mentioned; but where

Natural Increase

is permitted, the plan of proceeding will be somewhat different. Constant care and attention is needed where swarming is allowed, and if due precautions are not taken the prospects of a good harvest are ruined. In the first place we will consider my own method of

Swarming Without Increase.

In the earlier days of the *British Bee Journal*, when its dimensions had not been crowded down to its present limits, and every page bore the impress of practical demonstration, I was on one occasion challenged to show how swarming could be carried out without allowing increase of stocks. I immediately accepted the challenge, and gave my plan of swarming without increase;

and the same method was afterwards fully explained in my pamphlet of 1886. It consisted in either making an artificial swarm, and presently re-uniting ; or could be adapted to natural swarming.

Where a swarm is not seen to issue, a glance around at the entrances of the hives only should show the bee-keeper from which it came. Hitherto, all was life and activity, but look ! here is your hive with the entrance clear of bees, and but a few returning, while hardly one is seen to issue ; it is the "calm after a storm." A closer inspection of the hive will reveal the true state of affairs, and now remove all but one or two of the combs to another hive standing by the original, with the entrance turned away from the same. Secure the swarm in a skep or any other convenient article, standing the same upon the ground with clear space for ventilation under, and shade above. As soon as most of the bees have entered or clustered about the skep, carry the same to their original location and shake them into the hive, having previously arranged six or seven frames with full sheets of foundation, or $\frac{1}{4}$ -inch strips of such ; and not more than two frames of brood near the centre, with dummies at either end. It seems hardly necessary to advise my readers that no queen cells should be allowed on the two combs of brood given to the swarms. Any attempt at forming such should be discovered when occasionally adjusting the new combs being built.

The sections are to be replaced on the new swarm which will soon receive so many bees in addition from the removed combs that the remaining population will give up any idea of again swarming, and will destroy all but one queen. When the latter is mated and laying, the brood will be hatched, when the old queen left with the swarm is to be destroyed, and on the third evening

Unite the Parent Stock and Swarm

with the young queen presiding. The united stock should not have more than ten or eleven frames in all, while the remainder of the broodless combs can be used for extracting purposes.

When more than one young queen may be desired, break up the removed combs into the necessary number of nuclei with a queen cell to each on the eighth day after swarming, and re-unite as soon as the queens can be appropriated.

For obtaining one swarm from each stock, and in desiring to

Prevent After-swarms,

proceed in the same way, except that the removed combs and bees are to be placed at a distance from the old position, and no uniting takes place. This plan of obtaining one swarm and throwing the whole working force with the same, while making it a certainty that the other portion will cause no trouble was well known to, and practised by, most of the old masters. In this case, there is no time wasted in cutting out queen cells, an operation that cannot be tolerated in a modern honey-producing apiary. Should there be any fear of the bees being strong enough to swarm again, a few more shaken off with the new swarm will settle that matter. As soon as the young queen, or one already on hand, has six or seven combs crowded with brood, supers may be placed on her hive also, at the same time giving two more empty combs or foundation near the centre. Upon removal of the sections there will probably be hardly an ounce of honey in the stock combs, when another empty comb or two must be inserted and feeding be followed up, so that

the brood nest is gradually reduced and the combs stored for winter.

Combined Swarming and Doubling without Increase.

In my 1886 pamphlet, page 29, under "How to Control Swarming," I described my method of avoiding increase, while making swarms and securing immense populations, thus: "Select any two strong colonies . . . no matter how far apart, remove from one all the brood combs but two left in the centre with no queen cells; give their own queen and fill up with three frames, having guides only on either side. Now return *all* the bees by shaking and brushing from the combs, and also one-half of those bees from the second colony. Close the hive, and on the third day remove the old queen, and insert one of those recently fertilised. Then put on supers of a capacity of not less than 40lb. at one time, with all sections *filled* with combs. As soon as the upper set is completed, remove, and insert another in its place, though if the weather is promising, the district good, and the season still young, it would be much better to place the empty combs under that crate remaining. . . . If the apiarist is working with such stocks as alone give a profit, a large super room should be given *at the start* . . . but cramp them to begin with, and they are cramped in every way to the end of summer.

"Returning to the second hive, which had been deprived of half its bees, we place above them another hive containing the remainder of the brood combs from No. 1, filling up with empty combs or starters on either side. First arrange a hive with guides only at the bottom, and proceed as previously mentioned for extracting. The old queen in this case is not to be superseded until all surplus has been removed, when the nucleus reserved for

them may be united to such colony, and the combined forces fed up for winter, if more stores be needed.

“By the above, though with more labour, all the advantages of non-swarmling are obtained, and neither stock hive (whatever distance apart) is moved from its own stand.”

Modifications of this Method

of doubling swarms and uniting the parent stocks can be secured by using the whole of the flying bees of two stocks near together for making the new swarm, and then arranging the stock combs as another colony, as before. The other alternative is that of doubling the stocks as they are with the whole of the combs, bees, and brood, not forgetting the great point of supplying a young queen at the time.

Now is it not strange that prominent bee-men, year after year, are still straining after some method of controlling swarming. My pamphlet, from which the above is taken, was sold largely in this country and America, and prior to its issue no mention of a non-swarmling hive or system had appeared in bee-literature of the period. Only quite recently our American friends have been exercising their minds over artificial swarms which they propose to call “shook” swarms, because they shake off part of the bees from the combs of a stock to form a swarm to be hived upon starters; thus in attempting to control swarming they make

One Strong Stock into Two Weak Ones,

a process which no advanced *bee-master* should tolerate.

Bees can be so easily united during a honey-flow that it seems hardly credible any other plan of swarming can supersede that given in my work of 1886, where ordinary hives are used though even that is not equal to the more simple management of my Conqueror non-swarmling hive.

To those who wish to work their ordinary hives to the best advantage, I may say that

The Young Queens

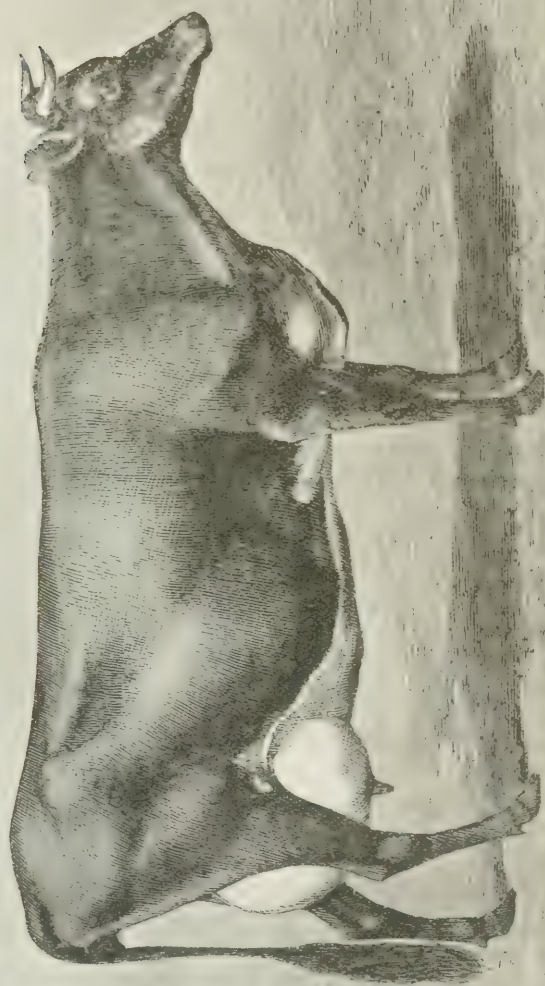
mentioned are first reared in nuclei, one is given to the united swarm soon after the operation, for two reasons, one being that no further swarming will occur, and another that all worker combs are more likely to be built by the bees. In the other case the bees are not likely to swarm with so much comb space allowed, and the young queen with her nucleus is *added* to the stock in Autumn.

Throughout all bee-operations the fact must never be lost sight of that every manipulation must tend towards developing that vast population so absolutely necessary to a great success.

Securing a Profit in Poor Seasons

is a matter of the greatest moment, but one seldom successfully grappled with by any bee-keeper. The hives are arranged for the summer's work, and should the weather continue unfavourable for the storing of honey the owner sees the season gradually slipping away from him while he remains perfectly helpless. He does, perhaps, feed when necessary, and return swarms as they may issue, but this is too frequently the full extent of his "management" (?), while the end of the season finds him only out of pocket on the year's unsatisfactory work.

Even if only an improvement in the quality of the stock had been made during the year, there could have been no loss, but, on the other hand, a decided gain. Indeed, it is the first duty of the progressive apiarist to rear young queens yearly from his best stocks, or by purchasing desirable queens from apiaries that can be relied upon for excellence of stock.



A Typical Jersey Cow ;

The property of Dr. Alfred Brown, of "Summerlands," Heathfield, Sussex.

This cow "LOVELY" gained First Prize at the Show of the R.A.S.E. at Windsor in 1880 for yielding the largest weight of butter and milk; and in the year 1890, for more than two months after calving, she gave seven gallons of milk daily, and 28lbs. of butter weekly.

However bad it may seem, there is almost certain to be one or two fair weather spells of a few day's duration, when by a careful amalgamation of forces, fairly good returns may be secured ; and, even in uncertain weather, stocks in good heart, placed close to any heavy crop, are almost sure to do well, and repay any trouble taken in moving them to such pastures.

The chapter on the Production of Wax may be studied to advantage ; while the chapter on Plumping, and other methods given herein, will show how a stock of good combs may be secured at a considerable profit to the bee-keeper.

The Cultivation of Fruit

will be a great advantage, and will pay both ways, if close at hand ; and where it is convenient to grow large flowering fields crops, with due thought for the bees, as well as profit on hay or seeds, a failure in the honey returns will seldom be known.





CHAPTER XV.

THE PRODUCTION OF HONEY, AS AN ABUNDANT SURPLUS.

THE system to be hereafter set forth is based upon the Author's non-swarming principle* explained in the preceding chapter. The reader will therefore understand that though not always expressed, it is necessary that the secondary chamber, or "safety valve," be provided either below or in front of the brood nest, according to the style of hive in use.

What is meant by Honey Production?

Do you know what it means to become a producer of honey, a producer on a large scale, a king among honey-producers? You will certainly not then leave each individual colony to just do its best upon its own merits, its own basis of strength, and doubtful possibilities. No, you must do the acting—you must be a man of action.

Why should you put down a colony of bees, simply

* Instituted 1878; published 1886, and since adapted in various forms by manufacturers and others.

place on a super when you think the fine weather has come, and so secure your 30lbs. or 40lbs. of honey, or less—or none at all, when on the other hand a rational manipulation on your part will reward your endeavours by the 100lbs. and more, to each hive.

Keep the brood nest freely open for the queen, so that her egg-producing powers may not be restricted, and see that the supers are fully expanded for storage. Cramping gives poor results, but a large hive, with large surplus room, will always, and will alone, be productive of heavy yields.

A large frame for brood-rearing, and a prolific queen of a good Italian strain, will provide an immense force of working bees. Native bees too readily crowd the queen out with honey and large masses of pollen, so that the population is limited, and even decreases at the most critical time, hence the reason why the largest results are seldom obtainable with the native bees in their purity.

Now, dear Reader, granted you have the most suitable hive, and the best bees for the purpose, and moreover have carefully studied how to secure your strong stocks, and then how to control their natural inclination to swarm, you are, I trust, fully prepared to gather in a very large proportion of that delicious sweet so abundant all around you.

EXTRACTED HONEY

is that which is removed from the combs by centrifugal force, without breaking them up ; while the liquid is consequently clear, and of far superior quality to that which by old-fashioned methods was obtained by straining the whole mass of honey, pollen, and larvæ, through a cloth.

A common practice is that of removing the honey before the cells are capped over, and large weights of such "green stuff" are often boasted of. As a matter of fact,

however, such honey never equals that left in the upper tiers of supers until thoroughly "ripened" by the natural heat and perfect ventilation of the hive. When the combs are at least two-thirds sealed they may be removed, and the contents extracted, when generally an article of good consistency will be procured.

In the artificial process of ripening, "green" honey loses considerable weight by evaporation of the excess of water, and being passed over a series of heated plates its quality is impaired, and is, of course, inferior in every

PURE ENGLISH HONEY

SUPPLIED DIRECT FROM

The Southern Apiaries.

NONE BUT PURE HONEY GRANULATES; when this has become so, it can be made liquid again (if desired) by placing the jar in another vessel containing hot water, when it will become as when first sealed up.

NOTICE.

I GUARANTEE this Honey to be quite pure, and free from the usual impurities of old-fashioned "strained" honey.

This is "extracted" from the combs (without being broken in the least), by the aid of centrifugal force; hence its superior quality.

(Signed) **SAMUEL SIMMINS.**

respect, as both the colour and usual characteristic aroma of honey is destroyed. The sooner bee-keepers give up these honey-ripening fads the better it will be for themselves and their customers; the best article only is that which will create a demand.

The word "extracted" has been objected to in some cases as being inappropriate, and that the consumer does not understand it. Nevertheless, the term will stand as long as the extractor endures; and if the public mind is likely to be impressed with the idea that "extract of

honey " is being offered, all the apiarist has to do is to show on his labels *why* it is called "Extracted" honey, and in what manner it is removed from the combs; as seen by a copy of my own label. The word "liquid" is certainly out of place, as our commodity is not always in that form, while the honey is liquid in our beautiful sections.

Bottled Honey.

In glass the wholesale demand is generally for 1lb. jars. The most popular kind is the jelly glass, and being so largely used the manufacturers are of course enabled to place them at a lower figure than any other kind. They are neat, elegant, and with a nice label, most attractive, costing 10s. 6d. per gross; with corks, 12s. 6d.; so that including carriage, bottling, &c., the total cost is a little over 1d. each (Fig. 43). Half and quarter-pounds can also be retailed at home, but are useless to the trade.

The bottles illustrated are especially suited for honey. Fig. 45 makes a good exhibition bottle; 43, the Greek design jelly glass; 42, a bottle very much appreciated by customers generally. These are manufactured by "Breffits," 83, Upper Thames Street, London.

For bottling, the honey must be particularly clear; and whatever shade of colour it may have, it should be bright and in all cases as before stated of such a consistency that it "piles" up well when drawn off.

Fill all bottles as evenly as possible and cork up at once, driving the latter home with a mallet, while holding the bottle in the left hand clear of any bench or shelf. Having filled your bottles, of course those with corks need some finish, and for capping the whole, nothing is more simple and inexpensive than

Sealing Wax;

but this article must be made at home. Procure common

yellow resin and heat it above a small oil stove in an earthenware vessel, or if preferred a large glue pot. Use one part of beeswax to three of the other to toughen it and make it hold to the glass. Now an important item is the

Colour

of the sealing wax. A *bright* colour will contrast well against the contents of the bottle, and the colouring matters used in common paint answer every purpose. Stir all thoroughly to get an even mixture, but at no time let the wax boil.

To Wax the Bottles

invert them with the cork and upper surface of the bottle just hidden in the heated substance for a moment. The operation can be rapidly carried out, and in lifting the bottles, give one or two turns that no bead of wax may run down the side. Now all is ready for the label, which must be of such a character as to contrast favourably with the contents.

Home-made self-sticking Parchment

for ensuring the air-tight sealing of honey or jam in jars, is an item many of my readers will be glad to know about, especially as it is so economical a process. Common thin paste is used, and into this the paper is dipped so that both sides are moistened. This is then pressed down over the mouth of the bottle and all round the under side of the rim. When dry this is superior to real parchment, no air can get in, and no tying is needed.

Milk, skimmed or otherwise, will also answer in the same manner; while both of these articles are cheaper, and more easily applied than the white of egg.

Paper similar to bakers' flour bags is suitable for the



FIG. 42.



FIG. 43



FIG. 44.



FIG. 45.

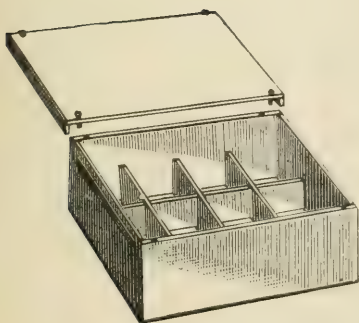


FIG. 46.
Bottle Crate for 1 doz.

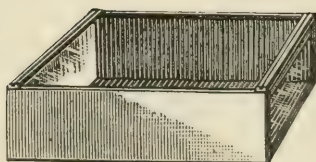


FIG. 47.
Comb Honey Crate.

purpose, and for commercial use a piece of cardboard cut to the right size may first be dipped into the paste and laid over, when the paper over this will make a very strong sealing. Screw-cap jars are expensive, and where a cheaper bottle will answer, this substitute for parchment will be more effectual in preserving the contents.

Canned Honey.

With prices much lower, together with a general and increasing demand, honey in tins is becoming popular. Two, three, and six pounds seem to be mostly in demand, and at reasonable rates large quantities of good honey can thus be disposed of. Colour is not of so much importance, and when granulated this is a good way to dispose of our produce ; but the article must be thoroughly ripened, and of good flavour. The most elaborate label that can be obtained is required to make tins attractive.

Bee-keepers frequently complain that they cannot dispose of their honey ; but if they only take the trouble to work their own neighbourhood at a *selling price* they will be surprised to find that instead of producing more than can be disposed of, they will be unable to supply the demand. Only recently I have been offered honey in considerable quantities at rates higher than what I could myself obtain twenty years ago. Honey has to compete with many other articles, themselves much reduced in value in these "cheap times," and supply and demand must regulate the price.

Having shewn how to prepare and market extracted honey, we have yet to consider the best means of obtaining it. First we must

Provide for extracting

by arranging our hives in the best manner for its production. A good stock of worked-out combs is invaluable

for this purpose, as we desire to give the bees plenty of storage room ; while there is no great necessity that the combs shall be completely sealed.

Those hives only are suitable for extracting purposes which admit of tiering up one above the other. Such chambers may all be of one pattern ; though with the stock hive only having standard frames, and that surmounted by successive storeys of shallow frames, would be better. In either case use the empty chamber below, which will also to some extent prevent the queen ascending higher than the brood nest proper.

Perforated zinc is frequently recommended to keep the queen down, having slots $\frac{5}{32}$ -inch wide, which presumably admit neither queen nor drones.

Deep hives, with the extra chamber for prevention of swarming, will rarely be left by the queen, and with a careful and judicious adjustment of the stock-combs no adapter will be needed.

All combs arranged for extracting should stand at a set distance apart all the time, as the surfaces will then be finished off evenly, thus making the uncapping process more rapid. It may even be an advantage to use supers with dividers, as first illustrated in my pamphlet of 1886. Shallow combs are filled better than deep ones, and can be more readily manipulated.

Metal Ends

are often used on the ends of brood-frames, for spacing at set distances, but there is really no need for them, and in experienced hands they are only impediments.

Where there is any difficulty in restraining the queen, as where all shallow, or all standard frames may be used, and the queen excluder is objectionable, then place all succeeding sets of combs *below* the brood nest as recom-

mended in Non-Swarming pamphlet; then extracting from the upper set as the brood is replaced by honey.

Mr. Howard has designed single strips of excluder slots with plain $\frac{3}{8}$ -inch sides, which can be inserted between the frame bars, thus spacing the frames at the same time, and being adapted to few or many frames. It will be found far better, however, to work entirely without excluder zinc in any form.

The best Queen-Excluder

is the powerful colony, *but* why should you super it just as you find it when you think it is ready, and becoming overcrowded? This is just what the average bee-keeper does, and then he wonders why he cannot do without excluder zinc, and moreover why his bees swarm as soon as they have made a beginning in the surplus chambers.

Right Here

I must repeat that the numerous editors and other teachers who are advocating the use of queen-excluder zinc are missing the great principle in honey-production, and general bee-management. Every advancing bee-master should grind this fad under his heel, and will rely upon the

Re-arrangement of the brood-nest before Supering,

for the purpose of giving the queen plenty of room, while at the same time ensuring a large population. The older capped and hatching brood combs you will place at the centre, while the uncapped brood will be placed to the outsides. This must be made a great point in management just prior to supering, and then the bees are obliged to carry all the incoming harvest upstairs; while the queen will have so much room below, where most

needed, that she will not trouble to shift her quarters ; and the outer combs will be so long occupied with brood that the workers will not get into the habit of storing there to begin with. See also the "Control of Swarming by Combined Swarming and Doubling."

Spare Combs for Extracting

may be obtained early in the season by inducing the bees to build out foundation (wired or otherwise), inserted in the brood nest ; or later above it. The combs will be tougher, and a larger population will be obtained if such new combs remain in the hive for breeding purposes, while the outside older combs can be removed for extracting purposes.

Old Combs or New.

Many bee-keepers who however produce extracted honey only in limited quantities, appear to prefer white combs for extracting ; such as have never been used for breeding. They claim that the honey is cleaner and lighter in colour ; but this is simply a theory which can not be supported by sound practice. Now, new combs have little to support their delicate construction, and when these are emptied and stored away the wax rapidly deteriorates, losing its oily nature, so that a wasteful process of renewal is repeatedly necessary.

Tough breeding combs are less likely to break in the extractor, the stored honey leaves the cells more readily ; while it is absolutely as clean and beautiful in colour as that from the whitest combs. I have had it so very white from my dark breeding combs in the surplus chamber that it has been as light and clean as sparkling water, and was mistaken for sugar syrup ; and too at a period when no feeding had taken place for many weeks, and the light honey was being brought in by the hundredweights.

When we consider that all cells are well cleansed and polished by the bees before being used as receptacles for honey ; and as it is self-evident that the tough combs will keep in store to far better purpose than the new and fragile combs, while the others may constantly be passed through the brood chamber to keep them in condition, there can be no question as to the greater economy in using breeding combs for extracting purposes.

With plenty of store combs and the "safety valve" below, the bees cannot well be idle if there is anything to be gathered. A common practice is to lift the upper storey and place another under, but where excluder zinc is used the brood nest is always retained at the bottom ; hence the bee-keeper's manipulations are much restricted.

When removing completed sets, let it be done during the busy hours of the day, when the few bees therein will soon leave if piled up in a room with large windows arranged as explained under Bee-houses. This, to my mind is far better than using bee-escapes to supers, and if a bee-house is not available, a large box or other case can easily be set up to answer the same purpose. Another way is to shake the bees from the combs, using a feather for the stragglers ; and still another, with shallow frames when fixed securely, is that first adapted to modern hives by James Heddon, of Dowagiac, Mich., who had not the slightest knowledge that his "shaking out" process had been long practised in this country with fixed combs, where we call it "throwing."

Empty sets of combs must be in readiness to give the bees where more room may be required, and when full combs have been emptied they should always be returned in the evening that all may be cleared up, and the consequent excitement subsided before another day's work commences.

Bee-Traps

have been revived both at home and in America, under the name of bee-escapes and super clearers. Some twenty-five years since these were much in vogue, but fell into disuse, as practical bee-keepers found they preferred, when once having raised the super, to clear it away at once and it is not a little surprising to find several advanced apiarists themselves entrapped into thinking there is anything to be gained by re-adopting this old and discarded fad.

Well, we have our stored combs in the outer honey house, and now they must go forward into the extracting room, having been cleared of bees. We must first be sure that our

Extracting Machine

is quite clean, and that it has been firmly secured in a suitable place, high enough that the honey may be run off into another large cylinder or tank, which again must have a treacle valve at a convenient height for drawing off. The strainer must cover the entire mouth of the tank, and be placed directly under the valve of the extractor. We now require an

Uncapping Can

which is to be in two sections, one fitting into the other. The upper part receives the cappings, having a strainer at bottom and one or more bars of wood or metal across the top whereon to stand the comb. While resting one end of the frame of comb on the bars, and the upper end held by the projecting ear in the left hand, with the top bar towards you, with a slightly diagonal and sawing motion carry the uncapping knife from top to bottom, removing not only the cappings but all comb that may

project beyond the plane of the frame ; reverse, and serve the opposite side in like manner, when the comb is to be inserted in one of the cages of the extractor with the top bar standing in a direction opposite to that in which the revolutions are to be made, as the cells inclining towards the top bar, the honey leaves more readily. Now, unless the

Rate of Speed

be carefully regulated, the operator is liable to break his combs, and thus render them difficult to handle ; but by turning slowly while emptying the first side, the great weight of the other will not force the combs into the wire netting. Now reverse all combs, at first working at a slow pace, but gradually increasing the speed, until you may set the machine going as fast as it can be made to revolve, having already removed the bulk from the opposite sides, though with a steady motion. When at full speed, slip off the multiplying gear if on the horizontal pattern, when a great many revolutions will be made while you can go on uncapping. The combs should again be reversed, and the sides first done are to be rapidly turned round in the same way. In this manner no combs are damaged, while every drop is obtained ; and *most of the revolutions take place while the operator is uncapping the next set of combs.*

The idea of again using simple motion is creeping in, being recommended under some false notions of economy. In these days of competition we cannot afford to “creep” along at a snail’s pace, and if we can do double the work in a given time, better and cleaner than the “slow-coach” method, surely we are threefold the gainers.

Combs containing Brood

can be extracted from only in warm weather, when the

speed required for the first side of heavy combs to prevent them breaking must not at any time be exceeded. With care, none of the larvæ will be displaced, and here again the multiplying gear will give the more even motion. It is safer to extract not at all from combs containing brood.

Storage.

Our honey is running through the strainer, and presently the tank will be full ; when it will be necessary to draw off and again strain into other receptacles, all of which must be convenient for filling smaller vessels as needed. In lieu of lids, the storage tanks must be covered with cloths carefully secured, when the honey will be more perfectly ripened, and after a few days it can be drawn off and will be remarkably clear, with the exception of two or three inches of the upper surface, which may be strained and placed with other surface honey. I have found no harm resulting from honey being stored in galvanized vessels, but where it may be required to stay for a considerable time, tanks should be of tin, though more expensive.

The produce of an apiary varies considerably in colour according to the plant it may be collected from, and each kind must be extracted and stored separately, as the different grades have varying values ; while one kind may granulate more rapidly than another, and if all were mixed together the entire mass would soon follow the action of the smaller proportion.

To prevent Granulation,

it is recommended that honey be heated to 190 degs. Fahr., and then corked up ; nevertheless some kinds will granulate in spite of this. The honey-producer, however, must be very careful that he does not injure his commodity. Honey should never be placed over a fire



FIG. 50.
Honey Knife.

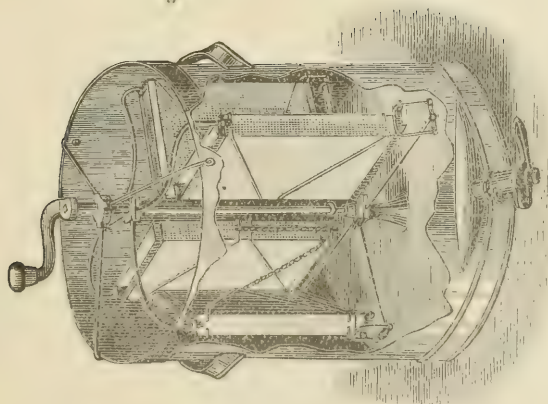


FIG. 48.
Stanley's Automatic Extractor (after Cowan).

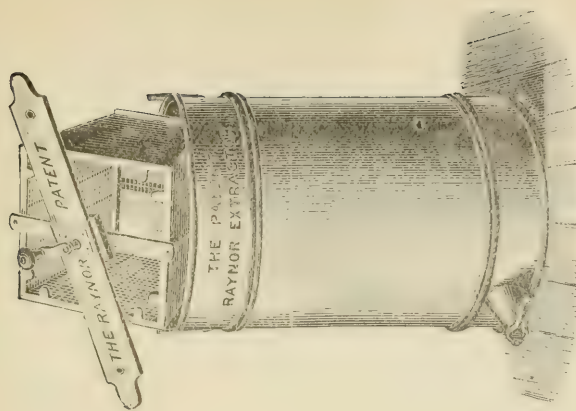


FIG. 49.
Meadows' Tinned-back Extractor.

without the vessel containing it being in another with hot water. Indeed in this case the water may be almost at the boiling point without doing any harm, providing the honey vessel is properly secured that no moisture may gain access. The washing copper to be found in most houses will perhaps be the most convenient vessel for the purpose, of course leaving off the copper lid.

Crates

for bottles should be made to hold either one or three dozen, the latter being most useful, as being the extent of the more frequent order. The divisions are best made of thin wood crossing and halved together, to form square recesses to take the bottles just tight. (See Fig. 46.)

For tins little is needed except a plain strong box of the right depth to take a 6 lb., two 3 lbs., or three 2 lbs.; all of which must be of the same diameter, a point too often overlooked, but an advantage appreciated when packing a large number, and being able to use one-sized crate for all.

Extractors.

The machine illustrated (Fig. 48) is of American make (Stanley's Automatic), in which the comb baskets are shewn to swing either way as required for emptying the reverse sides of the combs without removing them each time. The illustration is selected as presenting the uninitiated with a good idea of the manner in which the extractors are made. The advertiser claims that it is the only one of the kind in the world; but it is a matter of fact that Mr. T. W. Cowan was the inventor of the principle some years before the above was brought out; his "Automatic" having gained many honours, and more recently this invention has been accredited to the inventor by prominent American apiarists.

However, there appears to be some objection made to these, as the parts are liable to get out of order, and many bee-keepers prefer the old style where the combs have to be lifted out each time they are reversed.

Mr. W. P. Meadows, of Syston, has introduced an important improvement in extractors. As shown by Fig. 49, the wire cage against which the comb rests is itself backed by a sheet of tin; the two being firmly fastened together, with an intervening space. The cage, or comb basket, is made incapable of bulging by strips of tin secured to the back at right angles to the same, and running from top to bottom; thus permitting of a higher rate of speed without danger of breaking the combs. The extractor requires multiplying gear to make it more perfect, though a novice might certainly find it to his advantage to have an extractor wherewith he could not get up that excess of speed which would ruin his combs.

A Prophetic Caution.

I have on several occasions advised my readers to be most careful as to the style of frame they adopt for the purpose of extracting. Various widths are advocated, ranging from $\frac{7}{8}$ in. to $1\frac{1}{2}$ in. but let us once and for all time decide upon a

Perfectly Plain $\frac{7}{8}$ in. Frame.

Why? Because the time is surely coming—it cannot be otherwise, when uncapping by hand, will be superseded by a simple mechanical process. I was the first to offer a machine that would do it (1886), but I am still striving for something more simple, and am quite sure the long-looked-for process will soon be in evidence. Then why not keep this ultimate goal in mind, and help to make its advent less complicated, by adhering to a plain $\frac{7}{8}$ in. frame without lateral projections of any kind.

Exhibition of Extracted Honey.

Extracted honey for show purposes must be bright and transparent, enclosed in a bottle having a screw cap, that the contents may be readily reached. The glass should be of the finest quality and the jar as narrow as possible.

Messrs. Abbott, of Southall, provide a very neat glass as Fig. 45, designed especially for exhibition purposes. The jar already mentioned, in 1-lb. and $\frac{1}{2}$ -lb. sizes, will also be found very suitable.

COMB-HONEY.

Many more people have gone in for producing this article than that in the liquid form; consequently the price has gone down considerably during the past ten years. It has fallen something like 6d. or 7d. per pound, whereas the other has come down about 2d. It is time therefore that extracted honey had more attention if only to place comb at a better paying rate. Supply and demand, however, must regulate the price, and it is no use bee-keepers asking as much now as they obtained a few years since when the article was scarce, as wholesale and retail dealers alike are quite powerless to alter the state of the market.

The greatest trouble, however, is that all the small producers throw their comb-honey upon the market as soon as it is removed from the hives, and thus a false impression is made, and prices rule low, accordingly, though the probability is that the total output may be under the average.

Sections

have already been noticed in their various forms; and the kind one intends to adopt should be on hand before April 1st, when the foundation can be inserted during that

month ; that all may be in readiness, as a flow of honey is liable to occur any time after May 1st, or even earlier. In

Preparing Stocks for Comb-honey

it has been shewn under General Management that the brood nest should not be increased beyond the capacity of a ten or eleven-frame chamber of combs. The hive may appear overcrowded, but while you are waiting for the honey flow, put on an upper storey and work out foundation for inserting in the sections. It may be asked

Why the Brood Nest should not be Extended

at this time ? As a matter of fact, having already a complete brood nest, every day passing without an extension *adds a balance of power to the future working force* of the hive. Extend the brood nest and you not only require a greater proportion of the stores to feed the young, but a larger number of the population is needed to attend to the enlarged nursery instead of adding to the stores.

It should be distinctly understood that it is not always the larger population which gives the heaviest surplus, as it is possible for the hive of medium strength to send out a much larger gathering force. These are delicate points which require careful consideration but which are too often overlooked. An exception will be made where the plan of uniting is carried out prior to the honey flow, when for such doubled colonies two or more brood chambers must be allowed for the excess of numbers. In due time the

First Honey Flow

is upon us ; weather steady, and temperature from 70° to 80° in the shade, with plenty of forage in all directions. Our sections are all ready on the hives, providing not less than 40 lbs. capacity with combs all drawn out ; or 20 lbs.

to start with if only foundation is given, or with weaker colonies.

We are now in full working order, and in looking around we find here a hive and there another which require more surplus room, or the bees will in many cases prepare to swarm. Where any crates are completed remove them, inserting a fresh set in place of each. If foundation has to be used let that go next above the brood frames; and combed sections if on hand are to be placed above those already on the hive.

Final Development in Furnishing Sections with Comb.

With the Conqueror arrangement as in Class C, which has the sections completely divided, and these held in divided frames or twin holders, the full sheet of foundation is fastened on to *one side* of these $\frac{7}{8}$ in. frames, and each placed $\frac{1}{4}$ in. apart in the crates; one crate below the stock and one above. With judicious feeding these are rapidly worked out, and as ready should be replaced by others. As soon as honey is to be gathered, there are then a large number of combs ready. The other half-frame with its three-halved sections is placed against this partly-worked foundation; the other three halves are set on the opposite side and all pressed tightly together. Thus without any separate fixing of small sheets of foundation into each section, the reader is presented with the author's final development in the preparation of comb for supers. The two upper crates should be fitted with these new combs as soon as the weather is favourable for honey secretion, while the lower crate (under the stock) should be made to repeat the first process of comb preparation.

Worked-out or Drawn Combs for Sections

was made a great and original feature in my Non-Swarming Pamphlet published in 1886. It was practically the

basis of that method, and the Conqueror hive was then promised by me for the perfect working of that system, enabling the lower chamber to be handled as freely as the stock itself, or the chambers above it; so that all difficulties and inconvenience in the way of working the supers from bottom to top were finally overcome.

It may be both interesting and instructive if I here give some quotations from the above pamphlet showing the importance of that development in comb-honey production.

On page 10—"The bees can be at once crowded into "the sections; the latter being first fitted with newly-"built combs." . . . "The supers being all fitted "with combs, obtained as hereafter described, the bees "will fill those rather than go on comb-building to any "extent below. . . . Neither strips [starters] nor "full sheets of foundation will induce the bees to work in "them [the sections above] while so much room is allowed "in the stock chamber, and when one has once made up "his mind to start with nothing but comb, he will find it "can be done, and moreover, an immensely increased "yield will be secured thereby. The difference in "using foundation and ready-built combs in supers "[sections] will represent at least 30lbs. in favour of the "latter, as the bees store all their surplus above from the "very first."

Therein will be found anticipated the fear of hundreds of bee-keepers that comb-honey cannot be produced unless the bees are crowded from top to bottom, from side to side, and corner to corner of every available space in the hive. Hundreds of even prominent bee-men, editors, contributors, and others, still insist that such must be the case, in spite of the grand success of Simmins' Non-Swarming System, and its basis established upon solid

facts. From page 4 of the above work I give the following :—

“ It may be asked ‘ How can bees possibly be kept at
“ work in supers, when at the same time they have an
“ open space below, as well as several unfinished combs ?’
“ But this will be satisfactorily answered in the following
“ pages, and at the same time it will be shown that more
“ honey can be obtained, the combs in sections will be
“ finished rapidly, and, therefore, of good colour, every
“ comb will be built solidly all round, therefore the best
“ market-price will be commanded.”

It will be seen that Simmins' Non-Swarming plan, really a carefully organised and definite system, was founded as shown by these remarks, upon the fact that *Drawn Combs* in sections, expressly prepared for that purpose, would *ensure* bees working therein, while all the time a large space existed below the stock hive. This fact and this practice have been overlooked wherever failure to control the action of the stock has resulted.

The editor of *Gleanings in Bee-Culture* (American), recently introduced this subject as something new, while at the same time promising bee-keepers a fine machine-made

Foundation with Elongated Cells.

He afterwards candidly acknowledged that I had been more than ten years in advance of him, but I am sorry his beautiful machine-made combs were either too expensive or too delicate for economical use. Thin super foundation with no side walls takes up so little room in packing for transit or in storing, that I fear the more delicate and costly fabric may never come into vogue. Consequently, we must rely upon the rules herein laid down for securing

a large current supply of partly-drawn combs ready for the on-rushing accumulation of honey.

The Super-Space should be Reduced

towards the end of the season; and this is done by gradually removing completed sections, and finally closing up with the dummy. The open spaces thus left above the frames may be stopped by strips of wood or carpet. This plan is preferable to adding further sections, and the almost certainty of a great number being left incomplete.

An additional advantage is secured by this process of contraction as the season is closing. The bees are compelled to "crowd" on all the remaining comb space, and it does not appear to be generally known that while under this condition a far greater number of sections will be completed by the bees using honey carried up from the stock combs, even after gathering has actually ceased.

Remove Sections

during the working hours of the day, when a few puffs of smoke will generally send all the bees below. If this fails take out the combs one at a time and brush the bees off with a feather, first giving the section a shake; but the operation must be rapidly carried out, because as soon as once frightened they will commence to tear open the beautifully-capped cells, and it will therefore be seen that the sooner they are out the better. This, too, is one of the most forcible arguments that can be used in condemnation of the super clearers, for the bees once frightened by the lifting of the super, will not hesitate to break countless pin-holes in the beautiful cappings, more particularly when separated from the queen.

Grading and Bleaching.

When brought in-doors every comb must be looked over, while at the same time all propolis or other stains are to be scraped off from the wood, taking care not to injure the face of the combs. All the whitest and best finished are to be first selected and stored in crates piled one over the other, with ventilation right through the whole tier.

The next in order are those which, while being well finished, are not of such good colour. These are to be piled up fully exposed to the light and air for a time, when the colour will be equal to the first with which they may then be classed. If placed in crates for bleaching, the latter must stand singly or on end, so that the light may penetrate. A piece of straining cloth or wire netting should take the place of the usual lid meanwhile, that there may be a free circulation of air.

This question of bleaching comb-honey was first given to the bee-keeping world in my pamphlet of 1886, and in recent years the subject has received more attention, especially among American bee-keepers, some of whom think sulphur should be used ; but this is not necessary unless there is any fear of wax-moths developing. Light and air quickly alter the appearance of comb-honey, giving it the shade of comb rapidly filled with sugar syrup.

From my Non-Swarming pamphlet, page 16, we find this about improving sections of honey :—" The appearance of comb-honey is immensely improved after removal from the hive by being exposed to the air, and a woven-wire screen should be arranged for that purpose in some light dry room, free from dust. I need hardly state that no honey should be placed in the direct rays of the sun."

Those constituting the second grade will be all that

are not nicely finished, though there must not be too many incomplete cells. Those that are a little discoloured can be restored as before. Any that cannot come in as second-rate must have their contents extracted and the combs stored for future use; first making sure that no moisture hangs about them by placing a number over any strong stock towards evening, when the bees will soon clean them.

The Store Room

should be perfectly dry, thoroughly ventilated, having a concrete floor, and all so carefully arranged that neither mice, bees, nor other insects can gain admission. (For further particulars see *Bee-houses, &c.*)

Preparing for Market.

Crates can be made to hold anything from one to three dozen, the latter being mostly required. It is imperative that there be glass on each side parallel with the face of the combs, not only to make the package more attractive, but as the greatest safeguard against rough handling. As an additional protection against friction, the sides and bottoms should be lined with patent corrugated paper, when there will be little fear of breakages.

Though more expensive, the crate may be placed on a false bottom with coiled springs, of a power necessary to resist the weight that is to be placed above.

Sections should be enclosed in clean white paper, pasted securely where overlapping, when, if any breakage does occur, the contents of the damaged one will not escape and spoil others.

The above should be done with each section, whether fancy boxes are used or not, but while the latter additional expense may do if retailed at home, it will certainly not pay at wholesale. I have obtained as much for sections

without as others were getting with fancy boxes, in the same town ; one should therefore be careful before adding this expense to his commodity.

Section holders introduced by Mr. Woodleigh have been used largely, and will no doubt be more appreciated in the future. They are made of tin, folding somewhat like the American section, and will be found very durable, as, if soiled, they can be readily cleaned. They can be had in several colours, and though expensive in the first instance, that is not a very serious consideration, seeing they can be used many times without injury.

The Sale of Honey.

Where the apiarist retails his honey, of course he will always have his own label on it ; something as neat and attractive as possible. It is surprising what a number of bee-keepers there are who will send from 100 to 500 lbs. of honey to a distant town at a very much lower rate than could be obtained at retail near home, if only a little perseverance were used. This shows a great want of business tact, in thus depriving themselves and injuring producers at large by reducing the value of their crop.

In securing some efficient tradesman to handle honey, where one has a large quantity, some difficulty will be experienced at times, as there are many who will not put it forward. If a grocer himself owns bees, *his* honey is very soon passed over the counter ; and why not that of others where the grocer is not following the pursuit ? Perhaps the fault is with the price, but, nevertheless, being a comparatively new article, the retailer must be induced to take a lively interest in it. Make it attractive by providing a good show case and cards ; and let him have a consignment "on sale or return" to start with, and

there is no doubt he will soon send for more. Do not attempt to send any without complete protection from flies, etc., as this is one of the most frequent objections made against having it in stock.

Exhibiting Bees in Shop Window.

From time to time comes the same old tale: "How or where can I sell my honey?" And yet there are hundreds of bee-keepers who not only sell all they get without any difficulty, but have repeated calls for more.

One of my earliest designs in show-cards was to send the grocer in a large town an observatory hive, with stores, brood and a nice yellow queen with the bees; exchanging the same as often as the brightness of the exhibit began to wear off. This item was first given in "*A Modern Bee Farm*," 1887 edition, but the process, however, is an expensive one to keep up. Almost any producer with a few hundred pounds for disposal could afford to make a "start off" with just one exhibit, getting the grocer to make room for a nice glass case of comb and extracted honey on either side.

The A. I. Root Co. also speak very highly of the same means of advertising, in their valuable *Journal* of Dec. 1st, 1897. In their case an attendant gave a lecture upon the manner of securing honey, and also extracted several combs in sight of the assembled crowd.

Country Fairs.

I have often wondered why those who are troubled about selling their honey do not make some effort to dispose of it at the combined cattle and pleasure fairs so often held about the country. I know from experience that if only shown on such days there are to be found numerous buyers, who have not hitherto used honey simply

because they did not know where it was to be obtained. Stick on your name and address, and if possible, distribute honey leaflets by the hundred, and soon you will be wanting to lay out for a much larger "output."

Fruit and Vegetable Markets.

I wonder how many of my readers are still in bed and asleep, while an immense business is being done in the early morning markets of large towns? Probably not one in a hundred is astir, and yet what a number of likely purchasers of honey the early riser might find if he were only there with his commodity all ready for convenient handling!

Commission Agents.

Here is an opportunity for those who still say they have no chance of disposing of their crop. Why not try some one of the many fruit and vegetable salesmen in the central markets? There are many reliable business men among these, of long standing, who, doubtless, would be only too pleased to handle honey if put up in a convenient form. There is no delay, and back comes your cheque by return of post.

I came across a genuine cottage honey producer the other day, and said he: "I was talking to a gentleman one day, and he says, 'How about bees, do you sell any honey?' 'Oh, yes,' I said, 'there is no trouble about that.' 'Well, send me some, and I will see what I can do with it.' So I did, as I found he was a selling agent, or whatever you may call him, and he got me a very fair price, too, and is always ready for more. But other people I have usually supplied are already speaking for my crop that's yet to come."

This is as it should be, where a man keeps steadily on and works away with a will. There are many ways and

means yet for the disposal of honey, if the producer will carefully look about, without depending upon his County Association to do the work for him.

For Exhibition

combs must be visible on both sides, using for the purpose only those sections of the very best colour and finish. In some quarters it has been considered that the comb should not be sealed close to the wood all round, but this is a serious error, the idea being that the section can be more easily cut out; but I have yet to find the retailer who does not prefer those for his window which are sealed perfectly all round the edges; and when one of each may be placed on the scale, is there a doubt as to which the customer would select? Moreover those that are filled up to the wood will stand the risk of transit far better than would otherwise be the case.

Producing a Surplus.

How many hundreds of bee-keepers are there who are not bee-masters, and who seem unable to do at the right time the correct thing, and to carry out that comprehensive management which alone will give a large and profitable surplus?

One man will produce honey by the 100 lbs. to each stock and more, while at the same time some of his neighbours get their twenties, their tens, and their noughts, I give the reader an instance of a cottager who secured an average of 72 lbs. of section honey from his eleven hives during the unfortunate season of 1902, with no unusual crop near him, while other bee-keepers near secured twenty-one sections from one bar-frame, and nothing from another. Another had 110 lbs. from three frame hives; while among straw skeps, few had sufficient store for winter.

Young Queens ; No Swarming ; Large Profits.

My non-swarmling system as relating to the management of the Conqueror Hive ; and my original methods of controlling swarming are all set out in conjunction with the great corner stone of practical procedure—the production of young queens yearly, to take the place of the older queens at exactly the right time for ensuring the highest results according to the operation in hand.

I have already demonstrated that the Conqueror Hive is the nearest approach to perfection in the economic restriction of swarming, but it is not to be supposed that there ends all need of care on the part of the owner. For instance, if he will make a nucleus in early spring, and rear a young queen, she can be given to the stock while the older queen will build up the nucleus to a stock, to be united to the full hive after the season is over ; while, in the meantime, the presence of the young queen avoids swarming, and prevents the excessive production of drone combs.

Then, as regards “Combined Swarming and Doubling” without increase ; a young queen is given to the united swarm, so that further swarming may be avoided, and worker combs produced, ensuring the maintenance of a large working population.

Again, in simple “swarming without increase” ; as soon as the young queen with the old stock combs is well at work, the swarm and stock are re-united with the young queen presiding. The older queen may be destroyed or given a small nucleus to build up for further uniting at the end of the season.

The Cause of Low Averages.

is the want of initiative—the absence of definite action, by the average bee-keeper. He is content to take things

as he finds them, supering each stock in rotation as it becomes strong enough. There is no thought of doubling or of rearing young queens in nuclei; that they may be united to the stock at the right moment.

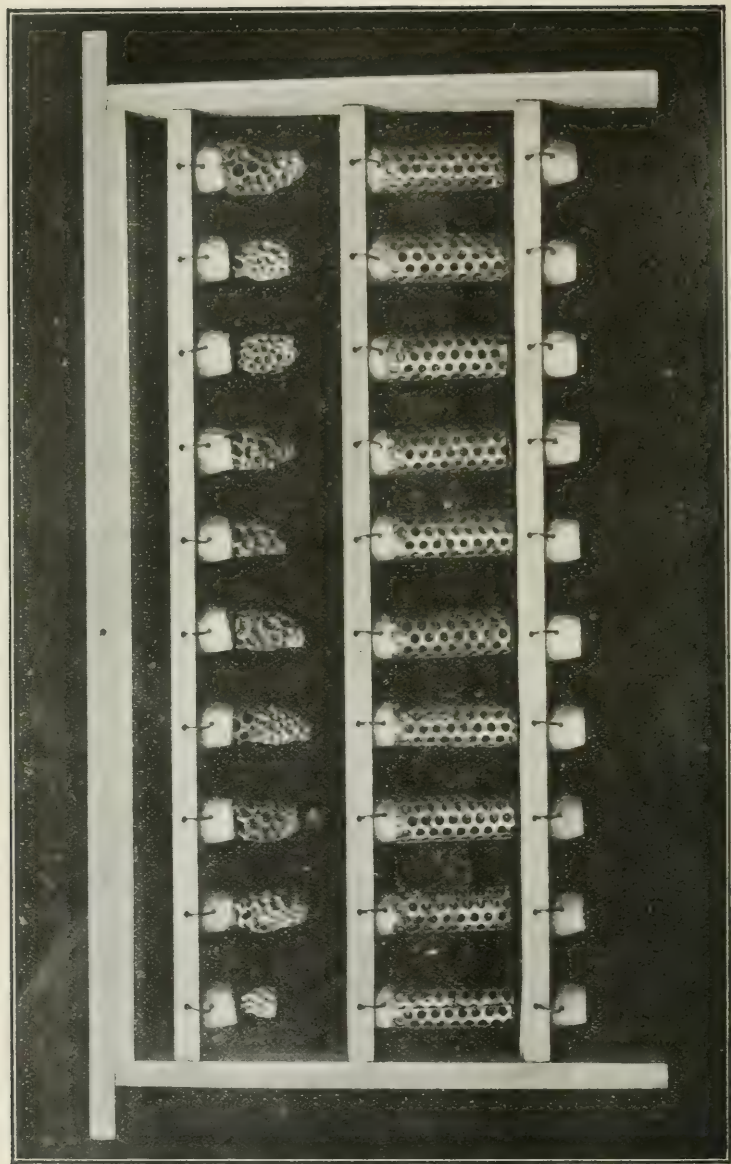
Weak or backward stocks, instead of standing all the season, probably with a poor queen, doing little or nothing, should be used as nuclei, each standing by a stock to which it can be united in autumn, or just before the heather harvest when it occurs. This question of young queens and doubling or uniting is so important that it would bear repetition on every page, and yet not be out of place.

The hive, of course, has much to do with the yield, but even improved hive construction is of little avail if its benefits are not supplemented by the works of

The Man of Grit.

The cottager mentioned secured 120lbs. from the Conqueror Hive, all in sections well filled, while his other best hives gave about 80lbs. each. In another instance, an Irish bee-keeper secured 208 well-filled sections from a Conqueror stock and its first swarm, the issue of which being a reminder that he had been too busy to attend to their wants.

Mr. Wells' report shows an average of 66lbs., nearly all extracted; but this is often largely exceeded by the more simple single hives; and Mr. Cowan's report of some years since, though also extracted, shows a higher average; his yield from seven hives being 1,360lbs., or 194lbs. per hive. In 1874, the latter gentleman also secured 907lbs. from twelve hives, of which 707lbs. were comb honey, an average of $75\frac{1}{2}$ lbs. per colony. These are profitable returns, certainly, but by no means so high as the reader should set himself to accomplish.



From a Photo

Fig. 08.—Simmins' Queen-Rearing Frame,

[by Mrs. J. W. Clapperton, Galashiels, 1894.

With detachable Cell-Bases, and his original 1887 Tubular Cages for confining the cells or hatching queens.



CHAPTER XVI.

QUEEN REARING.

IT should be understood that when a colony is deprived of its queen the bees are soon aware of the loss, and forthwith special cells are constructed upon larvæ that may be from one to three or four days old but very seldom are *eggs* selected in such a case of emergency. In due time a queen is hatched from one of such cells, and though she may have enjoyed the usual quantity of royal jelly, it frequently happens that the first to emerge from her cradle is one that is not well developed, as the oldest larvæ would naturally come soonest to maturity. Thus those which had been selected from the egg, or one or two days after hatching therefrom, and would have received only the royal food from the first day of their existence, and consequently are destined to be perfect in formation, are sacrificed to a dwarfed and ill-formed queen.

As already shewn, only one of the queens is reserved, though several may be raised. There are two points, therefore, of importance to the bee-keeper who wishes to obtain a number of queens. The colony that is to produce them must either be made queenless, or be main-

tained at a swarming condition ; and then he is to guard against the destruction of the surplus queens.

The Plan often Recommended

of simply removing the queen from a colony in normal condition and then inducing the bees to start queen cells where desired by enlarging the mouth of worker cells, is really more simple than practical. In the first place, one cell only is never large enough to form the base of a queen cell ; two at least are thrown into one, but more often three ; and where the bees have unlimited material at hand a queen cell will not be built upon one in fifty of such enlarged cells. I have had the proof of this assertion in my own apiary, and where Ligurians are concerned very often only two or three cells are started.

My own Plans

vary according to the condition of the hive under treatment and the season of the year. Thus, early and late in the season it is better to provide, or leave part of a comb in the frame, upon which to attach the cells containing the selected larvæ for queen-rearing. During settled bee-weather, the plain bars across the frame may be used for the purpose, or my bars with cell-cups or pegs attached, for greater convenience.

My Methods of Preparing Stocks

for queen rearing consist, early in the year, of removing the queen one day, and next day shaking off all the bees from the combs of brood, which latter are then removed, and the prepared comb of selected eggs inserted.

By the time the prepared comb is ready the broodless and queenless bees will have found out their loss, and being greatly excited are in the best condition possible

for starting queen cells. Place a comb or two of stores at each side, and after two or three days add combs of hatching brood to keep up a population of young bees.

Another Method

frequently adopted with great success in my own apiary is that of selecting combs heavily charged with brood on the point of hatching with all the adhering bees—using one from each of five or six good colonies, taking care not to remove either queen. Place these combs in a new hive which for convenience should have been carried round in collecting them, and after a few hours, or next day, insert the prepared comb of just hatching larvæ near to the centre. The young bees just congregated (of course, well provided with stored combs of *unsealed* honey and pollen) will produce some of the finest queens ever seen. Remove all queen cells that may be started on others than the prepared frame and add other combs of brood just being capped, so that later on as many good nuclei as possible may be made up from these stocks.

Or the same collection of young bees and brood may be placed in the cellar for two days, and the prepared cells given the third evening, when setting them out on a new stand.

Queen Rearing under the Swarming Impulse

is a plan that should not be adopted, though frequently recommended. The bee-keeper should do all he can to avoid rearing queens under the swarming impulse. Moreover, stocks kept up to this state are a great annoyance to the queen rearer in various ways. They are, of course, not available early and late, but when in season will always be building comb where it is not wanted, and making everything sticky with honey when these combs must

constantly be broken. These and other difficulties are not so much in evidence when all young bees are used for queen-rearing, while the cells are equally as fine, and the queens certainly more desirable. There are

Several Ways of starting the Queen Cells.

The new worker combs containing the larvæ just hatched from the eggs may be sliced as shown in Fig. 011, so that at least one whole cell is left in each; these are then attached to the lower edge of a comb reduced to a semicircular form; to plain bars across the frame; or to the author's removable cell bases; the attachments being made in a vertical manner by melting the wax on the, then, upper side of the base. All is done in a warm room, and the frame carried quickly to the desired stock.

Having experimented with artificial cell-cups since 1881, I must say that by the above plan, using worker cells, the bees can produce the queen cups upon them far more economically than the bee-master. In 1894 I carried out a series of experiments with drone cells attached to my bars and pegs, transferring the larvæ thereto, but only to return to the method given of transferring the worker cell cut down singly, with its tiny inmate as deposited by the queen, and started on its life journey by the workers.

The Cell Nursery.

Where a large number of queens are required, as soon as any queen cells are capped, they are to be removed with adhering bees to another queenless hive retained for this express purpose.

Mark each frame with the date of setting the eggs, and allow eleven days before cutting out the cells, that they may remain in the correct temperature of the hive until

the last, and yet be certain that none hatch to cause mischief.

Our cells, therefore, are not removed until the queens are almost at maturity, and now they are to be placed in the

Queen Nursery.

The best plan that can possibly be devised is that of using the cage, Fig. 09, which is placed over the queen or queen cells, where both honey and pollen are to be seen in the cells ; in this case the queens need little attention, and always feed in the most natural manner. Where hatched in other nurseries, they should at once be placed over natural stores in this manner, as no other plan of feeding them will compensate for the loss of pollen.

The Lamp Nursery

is frequently used and is invaluable for hatching queens. It consists of double walls and bottom of tin, with stays inside to keep the water from bulging out the sides ; and the internal capacity is large enough to take some half-dozen brood frames, with plenty of lateral space to spare. What might be added with benefit are small holes punched through near the upper inner margin of the tin wall to give moisture. The lid must be of wood covered with warm material, and if the whole is cased in wood, with the exception of an opening above the lamp, the temperature will be more even, and a very small flame will suffice to keep the chamber at about 95°, the boiler being filled in the first place with water at about 100°. The frames are placed in as the cells near maturity, and the young queens are removed as fast as they gnaw their way out.

The lamp nursery is sometimes objected to as being *unnatural*. Where is reason, if we allow such ill-founded

statements to influence our actions? Are our processes of queen-raising natural? Is our entire management natural? No! only in so far that natural conditions do not interfere with greater profits. Let me ask those who use the hanging-frame nursery if they have observed the temperature surrounding a queen cell with the bees always packed closely around it, thus giving greater or at least more certain heat than is required for the rest of the hive? If so, they will be surprised to find how much lower is the temperature surrounding their cells where no bees can cluster upon them, and where they do not even care to crowd upon the metal at each side of the little cages so many apiarists use in hanging-frames. All animal life is produced by heat, varying according as the nature of the creature may require, and for our purpose the lamp-nursery supplies the correct and even temperature desired.

The illustration, Fig. 68, gives the metal portion of my own queen nursery, an apparatus I had made in the first instance as an incubator for fowl's eggs. The rectangular portion shows the opening at the side, with a double casing on all other sides, with about one inch between the inner and outer walls. The whole of this compartment is inclosed by wood with a closely-fitting door which closes the said open side. The inside is fitted with skeleton framework wherein slide several drawers, each covered on the underside with woven wire. The same arrangement will also take whole frames of comb, but I prefer to have the cells built that they may be cut out singly and so placed in the trays. A thermometer lies on the centre division of one of the drawers; while another is fixed in a vertical position under glass in the centre of the door; this glass being again covered by a close-fitting shutter to avoid extremes; thus the internal temperature

can be noted at a glance without exposing the cells. With my arrangement, however, the heat is always given from above, and even after examination of the interior there is not the same loss of heat as with the nurseries hitherto used where the whole top is opened, as such have no large body of heat just where most needed for the immediate restoration of the correct temperature.

Though shown at one end, the hollow heating cylinder H C is at the centre of the back. Under this is placed the lamp, which has a wick of such a size that it cannot very well have a flame which will overheat the chamber ; the latter being about 18 inches by 12 inches by 9 inches. The boiler contains between the walls about six gallons of water, so that when the right temperature is once secured it does not vary one degree in twelve hours. The whole stands upon legs with a small table for the lamp to rest upon ; this is trimmed once in twenty-four hours, regularly every evening, so that there is no chance for the flame to drop during the night, when no attention is needed. As stated on page 150 of my 1893 edition, any cells expected to hatch may have the point passed into the tubular perforated cages, as used for inserting virgin queens, Fig. 08, thus obviating the constant attention otherwise necessary.

A sponge or cloth saturated with water, or a shallow tray holding a small quantity, should be placed in the chamber to induce the necessary moisture. The outer casing of wood has a movable lid, not very tight fitting ; but between it and the boiler several folds of flannel are laid, thus permitting a gradual change of air to take place in the cell chamber without loss of heat. A tin plate is placed under the bottom to guard against fire, an opening, of course, corresponding with that in the hollow cylinder.

Though the time of hatching is delayed under a temperature of 90° , I find queens will come out with perfect wings, but I prefer it regulated nearly as possible at 95° , so that in case of any accident there may be no danger resulting through slight variations. When properly managed, no intelligent apiarist will deny that the incubator or lamp nursery gives a more even temperature than can be obtained in the hive. That of the former is almost perfect, while the hive varies considerably, having its entrance always open to the outer air.

Make Nuclei from Queenless Stocks.

We have provided for the hatching of our queens, and must now prepare for their reception in nuclei. These are small hives to hold from three to six frames, the latter being more serviceable for our purpose, as there is room to add fresh combs of brood when necessary.

It seldom happens that good nuclei can be made up from a stock which at the time has its queen, therefore my own plan is in the first place to make up a nucleus with the queen of the most suitable colony, being one very populous, having a number of combs with hatching brood in each. Place this queen with one frame of brood and bees, and enough more to cover two other combs, on a new stand. On the third day thereafter make up further nuclei in like manner from the same hive, leaving the younger brood in the original hive, as there will be plenty of bees to take care of the same. Bearing in mind they have already lost their queen and having prepared for building queen cells, no further excitement will take place and not one-fourth of the number of bees will return to the old hive, as when the nuclei are drawn from one with a queen presiding.

Insert the young queens the same evening by allow-

ing them to run in direct, or place them in that most useful

Tubular Virgin Queen Cage

adopted by myself, and which has been in use in my own apiary for many years. It was described in my 1888 edition, and again in that of 1893. It is a small tube of perforated tin or zinc, a full half-inch in diameter, and two inches long.

The numerous advantages of this tubular cage have unfolded themselves by a gradual process of adaptation in my practice over a period of many years. As soon as I designed my new cell frame with detachable pegs in 1894, I saw how readily they would work in confining the young queens just about hatching, until one had time to remove them. One of the original photos was sent to the editor of *Gleanings in Bee-culture* nearly ten years' since, and yet just recently he shows something very similar, but with less convenient cell bases, as a new invention. Such is the treatment one gets from the hands of a busy editor. I have shown in former editions how my tubular cage was used for inserting virgin queens, [p. 152, 1893 ed.] either by stopping the open end with a piece of super foundation, as shown below the comb (Fig 09.) on the right ; or by pressing the open end into the honey at the top of the comb ; or again by inserting a ripe queen cell ; and in either case, just pressing the cage into the stores near the top of the frame, the open end always being downwards. The tubular cage to the left shows the detachable cell base used as a plug for retaining the queen while shifting her.

In uniting,

the queen to be reserved is just popped into one of these tubular cages, the end pressed down into the stores, and

presently when all is quiet, out she walks, with no further care from the operator. If she is wanted out soon, then the end should be stopped ever so lightly, but if it is desirable she shall not be out for a day or two, the open end is pushed harder into the honey. Perhaps you find

A Queen being "Balled,"

and instead of caging her fast, and perhaps only irritating the bees when again liberating her, all you have to do is to place her in my tubular cage, and simply press it into the comb diagonally as illustrated, where there are stores, so that she may quietly walk out after the bees have amused themselves for a few hours clearing away the broken comb, and dripping sweets. One can also

Remove one queen and insert another

at the same operation, without any further care, or thought of failure; and it does not much matter whether it is a virgin or fertile queen to follow. With a fertile queen press the cage home rather hard in this case, but with the virgin much harder, so that the latter may not be out until about the third day. I have practised this plan with distant apiaries, leaving a virgin where I removed a fertile queen, and at the next visit the then virgin would be a laying queen.

In Catching Queens

I present a novel method of securing them without pressure and with no need of touching them by the hand of the operator. My tubular cage is simply placed over the queen as she is found upon the comb, and in a few seconds at latest she is running up the tube, which is lifted and at once stopped with the finger.

The illustration of the hand shows how I frequently carry queens round to the hives (Fig. 010); for whether

the cages have to be left or not, I find this a very convenient way, and after getting rid of one I often lift a frame from the hive with the four fingers still holding the cages. Of course a whole handful of these cages may be carried round with queens, if the ends are stopped with the cell pegs, with foundation, cork, grass or paper; or they may just as well be in the pockets of the operator. We now come to the

Flat circular cages

illustrated upon the same comb. The reader of my former editions will know how severely I have condemned the practice of

Holding Virgin Queens in Candy-stored Nurseries.

It is a plan which I have never followed, being convinced, as Cheshire has also assured us, that the virgin queen absolutely needs free access to the cells containing natural stores of *pollen*, as well as honey. When free, she receives no care from the workers, and consumes a considerable amount of pollen, in building up her wonderful constitution ready for the onerous duties to follow. Consequently I select unsealed combs of stores consisting of pollen and honey, whereon the young queens are caged as shown, until they can be utilised. Twelve to twenty are placed on a suitable comb, and these inserted between the brood combs of a strong nucleus. In this way I also have

Duplicate Queens in Nuclei ;

and liberate a virgin soon after the earlier queen has been removed. This has always saved me much time and material, as a small number of nuclei will bring along many queens during suitable weather. I have frequently mentioned that I knew of only one way of

Giving a virgin immediately upon removing a fertile Queen,

and that is how it is done. The virgin being caged all the time in the hive, the bees accept her as soon as the fertile queen is removed. The plan however has recently been offered in America as a new and valuable feature, but an experience of many years, has shown me the dangers of relying too implicitly upon this practice, and I am compelled to give a

Very necessary Caution.

Repeating that given on page 30 of my "*New Queen Rearing*" (1894): "They positively will not accept the virgin until the third day, under ordinary conditions, and there is certainly no time gained by attempting to induce them to do so. I have by a certain process, given a virgin at the same time the fertile queen was removed, thinking I was about to gain time, but the result was so often unsatisfactory that I now never attempt to give a virgin until the third day. You see the bees were feeding and otherwise tending a fertile queen with largely developed ovaries. They continued the same process with the virgin in nearly all cases; she would then have the appearance of a fertile queen and lost the desire to become impregnated." One sees then the danger in considering this bulky virgin queen as one just fertilised, and the unpleasant business which would follow were she sent out as fertile.

Consequently even with duplicate queens, each must have fair play, while those following must not be let out under three days; and when considered fertile should not be sold as untested fertile queens *until they have capped brood distinct from that started by the earlier queens.*

Surplus Virgin Queens

Will probably be on hand, and where these cannot be accommodated by breaking up other stocks, one-frame nuclei must be made up provided with thorough ventilation, and in which are to be placed a comb of stores and some three or four hundred bees. These may be side combs from nuclei already established, and should contain no brood.

After these confined bees have been in an uproar for a short time, having already made provision for a small opening, allow the young queen to run in. Keep these in a dark room, and use as needed in outside nuclei.

It has been observed that a young queen feeds upon pollen extensively until she has met the drone, from which time she is fed by the bees entirely upon digested food. Now, just here, though it may be a repetition, I wish to show the

Folly of keeping Young Queens confined

in the toy frame nurseries for a number of days after hatching, as is done extensively, especially in several American queen-raising apiaries.

Without the nitrogenous food at this time, when their constitutions should be established, they are dragging out their existence upon sugar alone at the most important period of their growth. The editor of the *American Bee Journal* has repeatedly given his voice against the cheap queen traffic, and is it any wonder when they are produced wholesale with their marvellous powers thus impaired?

The confined one-frame nucleus certainly takes up more space and time, but both are amply paid for by getting more substantial stock, while queens being able to feed naturally will get mated sooner than those with a weakened constitution.

Simmin's Method of Nucleus Swarming.*

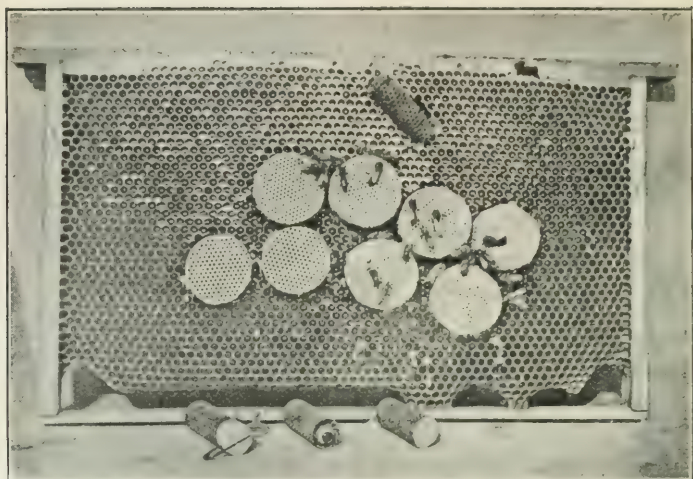
On page 25, it will have been noticed that for supplying all hives with young queens yearly, and to compensate for the non-increase of stocks, one colony in ten is to be devoted to increase by nuclei. In this case, the tenth hives are to be stimulated for brood rearing until the end of June, when there should be at least three chambers nearly full of brood in all stages. However, to be within limit, we will say twenty combs of brood and a number of stored and partly-stored combs.

The whole tier should now be shifted to a new location, one storey at a time, and then give the swarm (made as before) the eggs for queen-raising; this time an upper storey of combs or foundation is to be added, besides filling up below, as the much larger number of bees will probably store heavily. The moved stock will still have sufficient bees to care for the brood, the extent of which will now be immensely increased, as there are not enough gatherers left to crowd the queen out, though before shifting the hive the apiarist should have been able to give the queen plenty of room by alternating brood combs with foundation as the upper storeys were added, and extracting if necessary.

On the ninth day after setting the eggs, make up a nucleus with the queen (of the moved lot), this time standing the same by the queen-rearing swarm, to be united after forming the nuclei from the stock combs in a manner similar to that before mentioned, standing a nucleus by each of the full hives working for honey, to be united to them in the autumn.

By waiting till the date named more than sufficient nuclei can be made up, while the original queen will have

*Simmins' Non-Swarming System, Feb., 1886.



1 2 3

FIG. 09.

The Author's system of confining virgin queens upon natural stores of both honey and pollen. Also various uses of his original tubular cages.



FIG. 010.

Simmins' Method of carrying queens in his original tubular cages (1887).

From Photos]

[by Mr. Claude Flight

a full hive of bees to build up with again, and thus provide against loss, also having combs of eggs to spare for the nuclei.

The Young Queens

may be mated from their seventh day until they are as much as four weeks old. In fair weather, the rule is for them to be laying in ten or eleven days from hatching; but through unfavourable weather, I have had a number of queens under the closest observation failing to mate until the twenty-eighth day, and then successfully, having seen them come in with the drone attachment and in due course produce properly capped brood. I have had many mated at twenty-one to twenty-five days, while I have on several occasions seen queens return more than once with evidence of a successful union with the drone.

However, when a queen gets much beyond fourteen days, it requires the most sunny and calm spell to enable her to become successful in securing a mate, though such days are, of course, always desirable. Young and vigorous queens will occasionally fly at an opportune moment, and become successful in somewhat windy weather. But the temperature must not be low. It is only under a high temperature with little or no wind that general success is attained where queens are reared on a large scale.

Nuclei should be constantly renovated by the addition of fresh brood, whether they are to be soon united or not; and they should always be in possession of stored combs, in preference to any form of daily feeding, other than Simmins' dry feeders.

Eggs for Queen Raising

are more readily obtained from our select queens if the latter are in small colonies, having not more than

four combs well crowded with bees, and protected at the sides with chaff dummies. When a comb of eggs is removed, at the same operation insert another, empty, or a sheet of foundation if not too late in the season. Continue the process every two or three days if many queens are being reared, with a number of such hives to keep up the supply; and where it is likely that too much honey will be brought in to hinder the queen by the little lot getting strong, then carry the queen and two or three of the best combs of brood and accompanying bees to a new situation, thus providing her with attendants mostly too young to store a surplus. Use the remainder as a nucleus, or add to another hive.

Drones

are to be produced by stock which has shown good qualities and correct colour (if pure) for two generations back, as the colony directly producing them does not impart to our drones its own characteristics. For their good qualities we must look to the grand-parent, and the colony producing the drone which mated with her, if possible. Early drones are best secured by arranging drone comb at the centre of a well-provided stock the previous autumn. No useless drones should be produced as they consume considerable stores. A strong colony well provided and made queenless in autumn before the slaughter is likely to commence, will save their drones till winter, but the special breeding of drones for autumn work must be carried on during July.

Many bee-keepers and some of the various breeders endeavour to secure the

Correct mating of Italian Queens

in this country, but the process is such a disappointing one to the majority that the attempt is soon given up as

an impossibility. Ninety-nine queens out of every hundred turn out mismated, and the average breeder is content to become mere hybrids. The native drone is so much stronger on the wing than the average Italian that the latter is sure to fail. Consequently

A Process of Selection

and breeding the most vigorous drones has alone enabled the Author to secure a complete reversal of the above order of mating. By this means alone he finds it possible to secure correct mating in nearly every case, because he flies only those drones that are capable of outstripping any native males that may be in the neighbourhood.

But dear Reader, you may spend many years, or even a life-time, in endeavouring to breed up a more vigorous strain, if you will not see the necessity of "swamping" the neighbourhood with your picked drones. They must be flying in their

Tens of Thousands,

and you must not only be able to do this, but also quite prepared to sacrifice several stocks in the doing of it. Drone breeding colonies are of very little use for honey, and after midsummer are kept up with some difficulty, as no queen must be allowed them after the middle of July, when with liberal feeding your drones will be permitted to reach winter if so desired; but by then the workers, though brood may have been given occasionally, are not worth wintering. Consequently by the end of October I usually appropriate the stores for other more serviceable stocks.

The Colour of Combs

adjoining newly capped honey is known to determine to

some degree the cappings then used, but it is a fact not generally realised that if dark combs are used for the rearing of queens, those of a yellow strain will to a large extent have their colour impaired by the contact ; while very new and thin combs will have exactly the opposite effect, ensuring bright yellow queens.





CHAPTER XVII.

INTRODUCTION OF ALIEN QUEENS TO STOCKS.

ONE of the most interesting features in connection with Modern Bee-keeping is that of inserting queens, that they may preside over another colony with which hitherto they have had no relation. At first sight, therefore, it would appear that the bees will not hesitate to destroy the stranger; under some conditions this is the case, and various ways have been devised to guard against this disposition of theirs. The different methods come under two distinct systems: the old, called "Caging," and the new, known as "Simmins' Direct Introduction."

Generally speaking, the caging process is carried out by placing the queen in a small perforated compartment, wherein she is confined between two combs among the bees for forty-eight hours, when the bee-

keeper opens the hive carefully and allows the queen to run among her new subjects. If then attacked, she must be again confined, and tried after the lapse of another twelve hours.

Direct Introduction consists in so inserting the queen without confinement that the bees are either unaware of the new arrival, or are taken advantage of in such a manner that they do not attempt to molest her.

Of course it is understood that no other queen is to be in the hive at the time another is to be given, or the new one will certainly be destroyed. The novice may experience some difficulty in

Finding the queen

to be superseded, and he will certainly do better to leave his queens alone until he gains more experience, unless he is absolutely certain that any are actually failing. If he tries any new race, as yet he is hardly capable of forming a correct opinion of them, and the probability is that the natives will answer his purpose best for the first year or two at least.

In frame hives the fertile queen can generally be found without much trouble, as she is parading the brood combs, the hive being opened with as little disturbance as possible, and the frames gently lifted and examined one by one. If not to be seen there, look well around the edges of the combs, or she may be found on the floor, or at one corner among the bees; it may even be necessary to remove the combs to a temporary hive while looking for her around the sides, taking care not to get the brood chilled. An unfertile or virgin queen is often most difficult to find, and at times even an expert bee-keeper would be tempted to say that no queen was there, were it not that the actions of the bees tend to show other-

wise. A careful examination will generally reveal her presence; but failing to find her, when you think there should be one, the bees should be given a comb of unsealed brood, and if they build queen cells thereon it is almost certain no queen is there; if otherwise, do not risk the life of a valuable queen until the other has been found. With fixed combs the only way is to "drive" the bees out and catch the queen as she ascends. If that cannot be done, then look well among the deserted combs and the bees clustering in the empty skep. The length of the body, as well as its brighter colour, should enable one to distinguish the royal form, while it should be remembered that the queen's legs are always of a reddish brown color, those of the workers being much darker.

INTRODUCTION BY CAGING.

Procure a cage made of fine perforated zinc $1\frac{1}{2}$ -inch in diameter, and 1-inch deep, having one end only closed with the same material. When the queen arrives place her in this cage while yet indoors, slip a thin card under and carry her to the hive. Without removing the frames other than to give plenty of room laterally, slide the cage carefully from the card on to uncapped cells of honey, within the margin of the cluster, and press it down to the mid-rib of the comb with a cutting motion. The queen now has plenty of food, and if the perforations are fine enough the bees are unable to molest her. After forty-eight hours, give a puff or two of smoke, carefully examine the condition of the bees nearest the cage, and if simply passing their tongues through the perforations, the queen may be released without fear of the bees attacking her, but all the same watch their actions closely for a few moments. If all is well the bees will gather around her, but not thickly; those nearest will clean her with their

tongues, while one or two may be seen feeding her. Under that condition the hive may be closed and left, but should they be found clustering tightly in large numbers about the cage, at once close the hive and wait another twelve hours ; and in case a queen is attacked after being released (which is known by the bees forming into a knot about her and stinging each other in their endeavour to so do to the stranger, called "balling"), then confine her again, first dispersing the angry cluster by heavy smoking.

When inserting queens by caging, it is necessary to keep all queen cells destroyed, or the new-comer will seldom be received. She is to them unserviceable, and yet present in the hive all the time the bees know they have the means of raising their own, and hence a dislike once begun is only fed into an angry flame simply by the continued irritation caused by the constant attempt to get at the stranger, and not seldom by the bee-keeper's own interference.

Under this process of frequent disturbance, the queen will sometimes even herself be the first to attack the bees, and then, of course, there is no hope for her if not again confined. All these misfortunes are brought about through the necessity of operating by daylight, but there are one or two other methods which do not necessitate so much manipulation. The "Raynor" cage, consisting of a narrow and long wire cage, can be passed down between two combs from the feed hole in quilt (if one), while with a wire rod connected with a small hinged plate at the bottom, the operator can, after the usual lapse of time, release the queen without opening the hive. I must here add what I know to be an improvement:—*Release the queen after darkness has set in.*

Mr. Cheshire placed a flat cage on (not cut into) the capped brood, where it is held by a spring passed over

the top bar, when in the course of a few hours the bees cut a passage under the edge of the cage, and thus liberate the queen without further disturbance. For greater security let me advise something more definite : *Put the queen in towards evening, so that she may be liberated of a certainty during the quiet hours of the night.*

The introduction of that invaluable

Benton Mailing Cage

has made it possible to insert queen's safely without removing them. Most cages sent out by breeders now have a plug at one end, nearest the supply of food ; and the cage being placed above the frames after removing this plug the bees gradually remove the food and so quietly liberate the new queen.

But many losses occur by this plan where bee-keepers will not acknowledge the simple natural laws which govern the action of these interesting insects. If the queen is not likely to be liberated the first night after the old queen has been removed, she should not be allowed to escape until the second day has passed ; this being the most fatal period of any, as the bees having a lot of queen cells just prepared are bent upon destroying any new arrival inserted by the caging processes. From the third day and after, the insertion of alien queens is generally attended with no risks.

Though there are many methods of caging, I will call attention to only one more, which is deserving of some notice. Mr. G. M. Doolittle, an American bee-keeper, uses a flat cage, having an area of 4 or 5 inches square ; this, with the queen in, is pressed down to the mid-rib of the comb just over hatching brood. Of course all the young bees hatching out pay homage to the only queen they know ; and the cells thus vacated are occupied by

eggs laid by the confined queen. By this time there is not much doubt about the queen being accepted by the rest of the population, and she may be released. In this case it is evident that food must be present, therefore see that the cage also takes in an inch or more of sealed store.

Caging Queens with Young Bees.

Where food is given to a queen confined in the "Raynor," "Cheshire," or any other cage, *honey from the same hive should alone be supplied*; and on no account may any of the bees which accompanied her be placed in the cage; but it is advisable [1893 ed., p. 161] to give her an escort of some half-dozen young workers picked from the comb just after hatching, and taken from the hive in which the queen is to be caged. By these methods the most favourable time for inserting queens is during the months when they are breeding and storing; but in autumn the bees are more inclined to resent intrusion, where so much disturbance is necessary.

DIRECT INTRODUCTION.

A term first applied by myself in the year 1881, will be found much more simple than the foregoing, in that it enables the bee-keeper to insert a queen without loss of time and by two of my own methods to any colony, at any time of the year, whatever be the condition of the hive, whether it contains queen cells up to the point of hatching, brood in every stage of development, fertile workers, or no brood at all.

Simmins' "Comb Method,"

first brought to public notice by my pamphlet in 1881, consists in taking a queen from a nucleus, or otherwise, upon the comb she is parading among her own bees, and

then inserting the whole into the desired hive, using a little smoke as in ordinary manipulation. Be careful to carry the comb in an *uncovered* box from nucleus to full colony, and before inserting the same, part the combs of the hive to give plenty of room and admit light. (*See also "Uniting."*)

Simmins' "Fasting Method,"

long since practiced by myself and first mentioned in my pamphlet upon Direct Introduction, I have since improved by inserting the queen at night. The three things of importance to be observed are as follows:—(1) Keep the queen quite alone for not less than thirty minutes; (2) she is to be without food meanwhile; (3) and to be allowed to run down from the top of the frames after darkness has set in, by lamplight. It is also important that the same receptacle be not used twice over for holding the queen during the thirty minutes' probation without first being scalded or otherwise cleansed. Of course, a metal cage is easily made clean, though there is no objection to the cheap "safety" match boxes so commonly in use, as there is nothing obnoxious about this kind. My own practice is to carry the queens in the vest pockets, in small tubular cages made of fine perforated zinc or tin, one end permanently closed, while the other end is pressed into a piece of foundation after the queen is in. When ready, remove the foundation and let her run into the hive. Caution:—make no examination after inserting the queen, by either of the two foregoing plans, until forty-eight hours have expired.

The above meets all requirements, whether the colony has been long, or only a short time queenless; if it has brood or not, or queen cells in any stage of development. It is also applicable to any season of the year.

Introduction by Chloroform.

puffball, &c., is sometimes recommended, but I cannot advise such a course as to reduce the bees to a state of stupefaction, being not only injurious but totally unnecessary. Mr. D. A. Jones, late Editor of *The Canadian Bee Journal*, formerly a great advocate of this method, discarded it in favour of my Fasting plan, which he considered the most satisfactory of any.

Covering Queens with Honey.

It is claimed by some that a queen is generally accepted if first covered with honey and then placed among the bees; but the practice is one of doubtful utility; in the first place, there is no restriction as to *what* honey, and if any desire to try the plan, I must say that no other honey should be used but what is then and there taken from the hive the queen is to be dropped into. An ordinary pocket knife can be used to scoop out a little honey from the capped cells; or failing that, use the same syrup that is being fed to the bees. The body of the bee is studded with breathing tubes; it is, therefore, evident that much mischief, if not permanent injury, is caused by all being clogged with honey, if only for a few minutes.

Running Queen and Bees in at the Entrance.

Another method sometimes recommended, but long since tried and discarded by myself, is this:—Shake all the bees from the combs on to a board in front of the hive, and as they draw back through the entrance let the new queen run in with them. There is considerable risk with this plan, even when all are sprayed with thin syrup, scented or not, but I mention it more as a caution to the novice, that he may not be led astray, particularly as he would be liable to get the brood chilled before the bees regained their former position among the combs.

Simmins' Nucleus Method.

A plan which I have found very satisfactory, and which was first suggested to my mind by the fact that I had long made a practice of sending queens off with bees they had never seen until the moment of fastening down in the various receptacles they were to travel in, is as follows:— Make up a 3-frame nucleus in a small hive $14\frac{1}{2}$ inches by 11 inches inside (allowing $2\frac{1}{2}$ inch space under the "Standard" frame); then confine the bees, with ample ventilation, and as soon as they are in an uproar, having found themselves to be queenless, let the new arrival run under one corner of the quilt, first driving the bees back with a little smoke. Keep them thus confined in a darkened room, and liberate on the evening of the third day, standing the nucleus where it is to remain; and as soon as strong enough give a frame of hatching brood at intervals of seven days. Before inserting the queen, she should, for greater security, be kept alone and without food for thirty minutes.

Mr. Doolittle (of America) also appears to have discovered that confined bees will readily accept a strange queen. His plan is to shake the bees into a box, well ventilated, and as soon as they are in distress at the loss of their queen, he allows the new one to run among them through a small opening, otherwise kept closed. In a day or two the bees are placed upon brood and store combs, where it is intended they shall remain.

Few bees will return to the old hive in either case, but there appears to be more labour than with my own plan, in that bees are twice shaken from the combs; first, to place them in confinement, and next to provide the brood and other combs to start them in a new situation. By my plan, the bees have their own combs all the time, and

when liberated the same have already been largely stocked with eggs by the new queen.

Colonies long Queenless.

When I am aware a colony has been queenless for any length of time, I generally take out one of the central combs and allow the queen to run among the bees; if favourably received, replace the comb, but if, as it seldom happens, they reject her, then give them a frame of honey and brood, and insert the queen at night according to the "fasting" method.

In times of scarcity it is always better to have the feeding-bottle going when it is decided to insert a queen by any caging process. All the foregoing plans have reference to fecundated queens, but with regard to the introduction of

Virgin queens,

hitherto there has been great uncertainty, and the only satisfactory plans I have found are :—(1) By introducing to a confined nucleus as shewn above for fertile queens; (2) by the tubular cage before mentioned; in this case pressing the open end into *thin* foundation after putting in the young queen, or by pushing the open end diagonally downwards into the sealed stores near the top bar; (3) by allowing three days to pass after the removal of a fertile queen, and then inserting at night, and (4) by duplicate queens caged where a queen already laying is to be removed.* (*See also Queen Rearing.*)

Queens dying in Cage.

When inserting queens by the cage it sometimes

*No. 4 was mentioned in my "New Queen-Rearing" Pamphlet, 1894; while the other methods were described in my earlier works.

happens that they are found dead. This results from one of two causes: either want of food, or death by stinging or worrying, as the perforations are too large in almost all cages used. The former shows the danger of using such cages as do not press into the combs, should the bees be disinclined to feed the stranger; while the latter evil can be remedied by using perforations no larger than an ordinary pin will pass. We may now, indeed, consider the period of uncertainty, as in the days of queen caging, to have passed away. Under the author's own management, the subject of queen introduction has been reduced to a certainty. In addition to the methods of direct introduction, already enumerated, the experience gained by an extensive practice has resulted in the following additional observations, which must prove of service to many who may have cause to introduce queens.

A fertile queen is rarely objected to where queen cells are already capped over, and one may be run in at any time of the day. Any such colony will also accept a virgin queen right away, and if broken up into nuclei the respective divisions will accept one or more unfertilised queens. Upon the removal of a virgin queen, a fertile one will almost certainly be accepted if inserted at the same operation.

A colony deprived of the queen and the whole of its brood will accept either a virgin or fertile queen as soon as they are in an uproar because of such loss. The absence of the queen is detected almost immediately when the brood also is removed. Many bees are lost if bees are allowed to remain thus deprived for any length of time. My first Holy Land queen was introduced in this way over twenty-five years since, and though there is some trouble in removing the brood, I have always found the plan reliable, and the bees humming merrily, in pos-

session of a new queen, within an hour of the removal of their own queen and brood.

The Loss of Valuable Queens

has frequently been deplored, and yet the persons attempting the introduction went at it in a most clumsy way, especially when we consider that better and more certain methods were known to them. Valuable or other queens need not be lost if only the most simple precautions are taken. For instance, absolute safety can be ensured by removing a frame of hatching brood from a hive, and after shaking off all the adult bees, this brood comb placed in a narrow nucleus box will soon produce many hundreds of young bees who of a necessity will do homage to the only queen they know. The box can be stood in a hot-house for a few days, or hot water bottles can be kept going on either side, and within a week another like comb can be added and full liberty given by placing the nucleus in the permanent hive. Food should be present while confinement lasts, and a supply continued if the weather is not favourable.

Simmins' Direct Introduction Proved.

It is only in the ordinary course of human nature that my very successful system of direct introduction should have some envious detractors; but a more extravagant statement than that made by one bee-keeper can hardly be imagined. It was to the effect that while he admitted "the queens would be safely introduced, they would not lay for many days, and the bees paid them no attention, consequently, in a short time a number were thrown out of the hive."

In his eagerness to condemn the system he only shewed the more plainly his own ignorance of the nature

and habits of bees. It is no fault of the system, if he experimented only with aged queens, or, on the other hand, inserted virgin queens, which, failing to mate, turned out useless, or were lost because of unsuitable weather for them to fly and become fertilised. Strange, indeed, he does not know that if a queen is once accepted she is at once treated as the reigning queen, and no amount of specious reasoning to the contrary can alter the fact.

Why is it, in my own case, my queens go on to lay *at once*, and remain in the respective hives month after month, and are only removed when sold, it may be one two, or twelve months thereafter?

And why should numerous correspondents write as follows: "I have inserted thirty queens by your method and all have been successful and done well"? The number may be more or less, but the unsolicited testimonials must have some element of truth in them! Note Mr. D. A. Jones' statement, already given; surely he would not favor the method if it only meant loss of queens!

Who has once read the late Mr. F. Cheshire's testimony in his valuable work, and can for a moment doubt the value of my system? "Following up the question, I tried many dozens of experiments, and found that by Mr. Simmins' method it was quite easy, and not only to introduce, but to get one queen *to lay* in half-a-dozen distinct hives in a single week. . . . My trials have, I believe, embraced almost every supposable difficulty and variation in season and in the condition of the stocks, and show the system to be practically perfect. . . . Direct introduction, as taught by Mr. Simmins, has saved me queens, time, and anxiety, and I feel pleasure in expressing my indebtedness."

Yet other evidence is given by the editor of the *Bee-*

keeper's Record of Dec. 1st, 1887. After detailing his experience in inserting by my method seven queens "at a season and under circumstances such as made us formerly careful to an extreme, we are glad to be able to pronounce the method a complete success. . . . We can now understand how friend Simmins is able to guarantee safe introduction, and we rejoice at being able to chronicle another point gained."

The foregoing statements will show the value of the system as applied to varying conditions of the bees, or the seasons, and as the editor of the *Record* himself says, "The introducing cage bids fair to be relegated to our collection of curiosities."



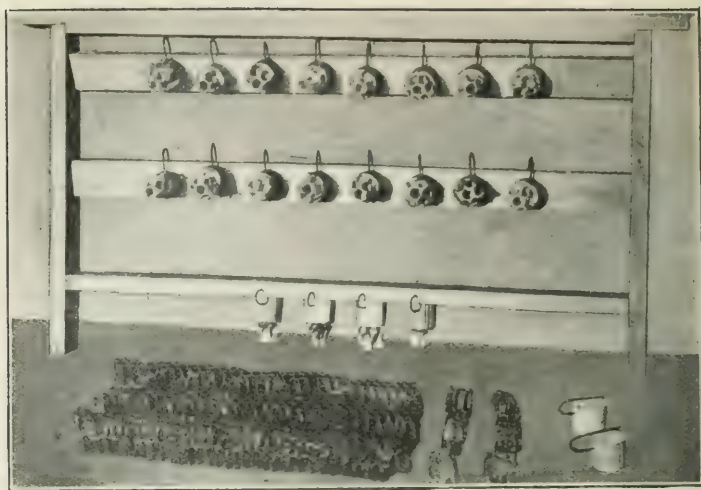
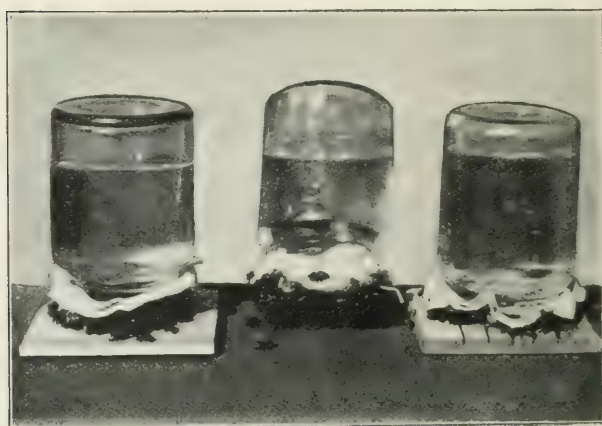


FIG. 011.

The Author's method of preparing for Queen=Rearing.



1

3

2

FIG. 012.

Simplicity in Feeding behind the Dummy.

1—Slow; 2—Fast; 3—Rapid.

From Photos

by Mr. Claude Flight.



CHAPTER XVIII.

FEEDING AND FEEDERS.

WHEN and how to feed are questions of considerable importance to bee-keepers generally. In the apiary where bees and queens are raised for sale, feeding has often to be resorted to, as nothing is so exhaustive as the production of bees and queens on a large scale. Many colonies are reduced to such an extent that the remaining bees are occupied entirely in brood rearing, forced on to the utmost by the master. Honey is quite a secondary object; bees *must* be had. Consequently, honey cannot always be obtained even when the average colony is storing, and the forcing process must therefore be kept up by some substitute.

Simmins' Dry Sugar Feeding.

For spring feeding generally, and for use with nuclei, I have found nothing so stimulative as my plan of dry sugar feeding. The feeder consists of a hollow dummy with one side hinged on simple wire nails and held by the same above; or by staples turned at right angles to project over the margin below and a turned wire inserted at either corner at the top, which can be moved out of the

way to allow of easily removing the side. The space between the sides should not be more than one inch, or comb will frequently be built therein.

Correct versus Incorrect Application.

Dry sugar feeding became practical only when I introduced the feeder that enabled it to be carried out in a practical manner; but unfortunately substitutes have since been offered, which, being incorrectly constructed and applied, have been the means of bringing the practice into disrepute, and thus many bee-keepers have been robbed of a means of feeding which, when correctly carried out, proves a great saving of time, and one of the best stimulants to breeding and comb-building.

You see, the bees must cluster in a dense mass in the narrow chamber (Fig. 06), therefore maintaining a high temperature, and under this stimulus quickly reduce the grains of sugar without waste. If placed

Next to a Frame of Brood

the bees will at once crowd into the dry-feeder, when the temperature of the whole hive will rise, and the broodnest be greatly extended.

Sugar known as Porto Rico, a soft, moist article, is used, being pressed in tightly, and the bees, entering above the movable side, which does not reach the top bar by $\frac{1}{4}$ -inch, are soon busily engaged in reducing the food to syrup.

In spring it is necessary that the moisture of the hive be retained by placing American oilcloth next above the frames and plenty of warm material above that. All that is required is that the air does not become too dry, and then the sugar will attract moisture to itself and greatly aid the bees in their own processes of adding the neces-

sary liquids. If so little covering is placed above the non-porous cloth that condensation takes place, the sugar is used up too rapidly and the queen crowded out; especially as the temperature is so reduced that the brood nest cannot be extended.

The feeders (Fig 06) are placed as an ordinary frame at the outside of the brood nest and the bees allowed only so many combs that they are crowded into them.

Another very serviceable frame feeder I have in use holds 9 or 10 lbs., and is 3 inches across inside. The bottom is simply a sheet of finely perforated tin placed in an arched form, so that the bees may cluster under and appropriate the sugar through the perforations.

Syrup Feeders.

If a stock happens to be very short of stores in spring, I find it best to give a feed of syrup to put the bees in good heart, and then follow with the dry sugar. In autumn, when surplus receptacles are removed, it may be too early to finish off feeding all at once, and it is well to give ten or fifteen pounds of syrup immediately and finish gradually with a ten-pound dry feeder. This is, of course, where all the honey has been placed above, but where any have considerable stores on hand but not enough to winter, the balance must be made up rapidly with syrup not later than the end of September; when it is necessary that the combs should be almost solid.

Simmins' Syrup Frame Feeder

(Fig 54) holds about twelve pounds; is $4\frac{1}{2}$ inches wide, and otherwise of the "standard" frame dimensions. The joints are all tongued and well put together that no leakage may occur, though it is advisable to paint the whole inside to prevent saturation. There is a slot along the

top on one side nearest the bees, by which they are allowed to enter a $\frac{3}{8}$ -inch passage between the outer and inner wall, where a good footing is obtained while taking up the syrup. The sugar is held clear of the bottom by a piece of perforated tin in an arched form, thus admitting of a free circulation of liquids under the dissolving sugar. No cooking therefore is necessary, as the usual quantity of sugar and water (a pound of sugar to half a pint of water) soon amalgamate in the form of syrup. The proportions named happen to be correct for this system, as it will be found that a residue of sugar will be given where more than the pound is placed in the half pint of water. Another feeder for the top of the hive is my

Circular "Amateur,"

which I have arranged upon the same principle, as will be readily understood by the illustration (Fig. 51). This holds about 7 or 8 lbs. at a time, and the inner funnel leading up to the syrup passage around the same is lined with wood, or a lamp-wick can be used leading down into the cluster in cool weather; though if feeding is necessary at such times it is always more satisfactory if the syrup is warmed. Among

Bottle-feeders,

we have the "Raynor" (Fig. 52) arranged to give a graduated supply, with a projecting point attached to the perforated metal cap of the bottle, indicating by the figures to which it points on the stand the number of holes to which the bees have access. The underside of the excavated block is lined with warm material, though generally of a kind that is annoying to the bees, and which they soon tear away. If painted with wax it would be equally as warm, and more appreciated by the bees.

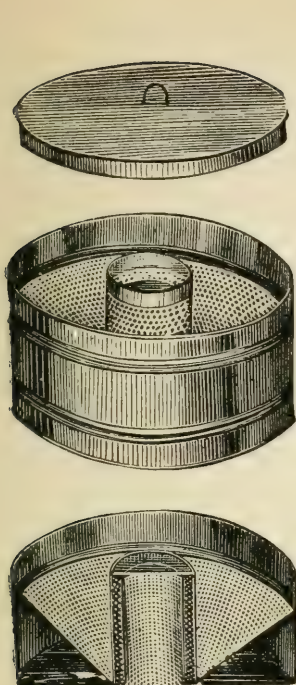


FIG. 51.
Circular "Amateur" Feeder.

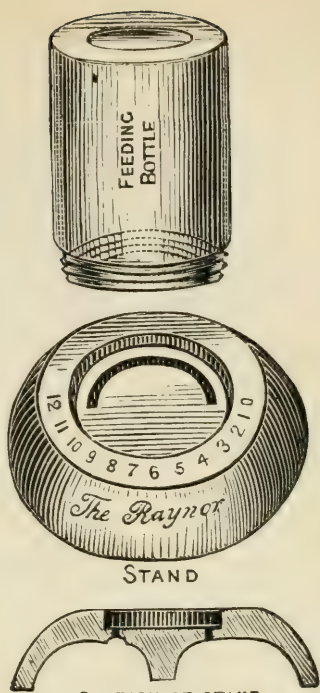


FIG. 52.
Raynor Bottle Feeder.

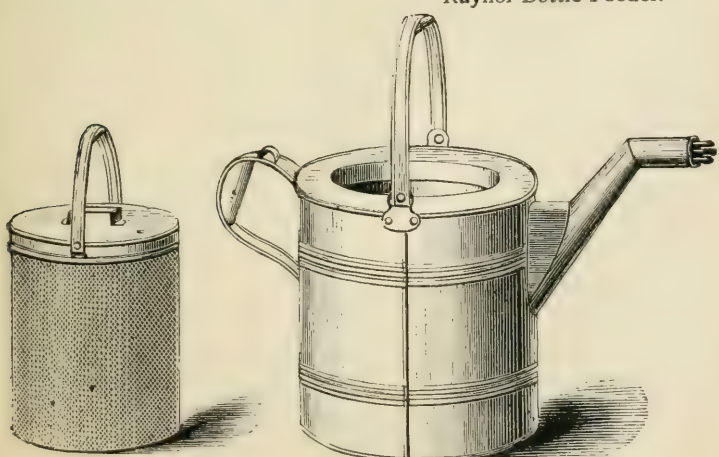


FIG. 53.
Self-acting Syrup Can.

Messrs. Abbott have long had something similar, though more simple and less expensive ; but there is one great disadvantage with all bottle feeders, in that they are subject to atmospheric pressure, and with a sudden rise of temperature the expansion causes much waste of syrup. The syrup has usually been boiled when prepared for this class of feeder, but for my own use I have large cylinders on the self-acting feeder principle which reduce about 2 cwt. of loaf sugar at a time, the sugar being drawn off by a treacle valve at the bottom. The syrup-can illustrated (Fig. 53) will also be found very suitable for smaller quantities, saving much time and trouble in cooking : the self-acting principle being the great feature in this, as in my Champion Feeders.

Inexpensive Bottle Feeders

are as shown by Fig. 012 ; a double thickness of cheese-cloth, or old linen, being tied over the mouth of a common jam jar, the bottle is inverted and placed flat on a thin block at the back of the hive. If slow feeding is desirable, then use the plain side of the block as on the left : if faster then invert it over the grooved side ; or for rapid feeding, tilt the bottle up at one corner. Of course, in this case two or three of the combs are removed from the hive, and it is not only inexpensive, but has the advantage over top feeders in that the syrup is soon raised to the temperature of the hive, as also is the case with my frame feeders.

Feeding up 100 Colonies in a Week.

A very simple feeder is one adopted by myself many years since, and by its use it is possible to feed up one hundred colonies in less than a week, each stock being capable of carrying 12 to 15 lbs. of syrup from the feeder

to the combs in a single night; the best time for filling the feeders being about dusk, as this avoids robbers, and also prevents loss of bees through flying because of the sudden excitement.

Good sound wood is selected, and plain boards fastened on each side of a frame of any desired width. Put the nails in rather close together and paint all joints with white lead before making up (Fig. 54a). The syrup is poured in, while warm, after turning back the quilt, and the bees go in by a slot on the side. It does not at all matter about pouring the syrup over any bees that may be in the feeder, as they are soon cleaned up by their fellows. If a float is used it should be half-an-inch narrower and shorter than the inside of the feeder.

In many apiaries feeding is seldom resorted to, but there are times of dearth when valuable colonies would be utterly ruined were it not for the timely assistance rendered by the owner—assistance that sooner or later is repaid a hundredfold.

Of course, if feeding is absolutely necessary after the surplus receptacles have once been occupied, it must be simply from "hand to mouth," that nothing be stored in supers; while it may even be desirable to remove such entirely, replacing them when better times put in an appearance.

Feeding without Feeders

is something that needs our attention before closing this chapter. Of the various methods offered for filling stock combs with syrup, to be placed in the centre of the brood nest for stimulation, or near the outside for storing, no plan can be so effective and simple as that employed by Mr. W. Raitt, of Scotland. He used a common syringe, placing the comb in a drip pan, while driving the syrup

into the cells. The filled combs are carried to the hives requiring them, while sometimes a chamber is filled up with them and placed bodily under the stock chamber which has to be stored.

A simple method of giving "dry sugar" is that of first placing a layer of strainer cloth upon the frames; the sugar above that, and pressed into a compact mass, with the usual quilting next that, nicely tucked up to keep all warm. Common paper will do in place of the straining cloth if two or three holes are first made through to give the bees a start.

Feeding with Candy

is another matter requiring serious consideration, for certainly it is a process more frequently abused than properly used. This article has generally been brought into requisition where stocks from any cause have run short of food too late in the Autumn, or during Winter, when it is supposed other plans of feeding could not be adopted. But with due care, no stock need be left alone long enough to get into that state.

It should be distinctly understood that

No Feeding should take place in Winter,

and though candy is often recommended, it is far better to unite to a well-stored stock in the autumn than to feed in any way during the months of repose. If a stock is found deficient in stores at the latter part of winter, then give combs of sealed food with as little disturbance as possible; placing such flat on top of the frames and covering up warm if the weather is very bad. It is better at any time in Winter to give a dose of hot thick syrup, if only two or three pounds, than to rely on candy. The

object is to get the bees along until February is well advanced, and to feed not at all until then if possible.

No stock, however disheartened, will refuse to take a bottle of hot syrup, placed directly over the cluster on to the naked frames, and in two days or less they have the best of food around them with but little excitement, while candy is a cause of constant activity.

The Most Profitable Period

for using candy, indeed the only safe and profitable time, is from the month of April onwards, while building up stocks ready for the harvest. The progress of a colony at this time is most remarkable where candy is judiciously applied in frames holding six or eight pounds at a time. This has been my practice for many years, ensuring as it does, constant progress, no matter even if there may be a return of frost and snow, as frequently happens to the serious detriment of many apiaries. For

Making Candy

the usual proportions recommended are one pint of water and one wine glass of vinegar to eight pounds of good loaf sugar. This is stirred well over a clear fire until all is melted, and is then allowed to simmer with occasional stirring, until a drop or two placed on a cold plate will almost immediately set hard, or will at least not stick to the plate. A large news sheet placed on a table with the edges folded and turned up at right angles all round, and these blocked upright with pieces of wood or other articles, will form the most convenient receptacle for general use. As soon as the surface is set, it should be cut across with a knife so that suitable sized cakes may be had without waste in breaking.

Where systematic Candy feeding is to be carried on in

Spring, the better plan is to pour the hot liquid into wired frames, fastening them down to the table or a flat board, with paper between, by means of a couple of nails, or specially prepared blocks. It can also be poured into the dry feeders.

The vinegar can be dispensed with and a much better quality of Candy secured by using only one pint of water with one pound of honey to eight pounds of sugar, but this should only be used where it is known the honey is free from disease. Honey Candy should never be bought, unless the seller gives a guarantee that the honey used is free from danger.

The Author's Candy

is made as follows. Place 8lbs. of good loaf sugar in the saucepan ; upon this pour three-parts of a wine-glass of vinegar ; add three-parts of a dessert-spoonful of salt ; and finally one pint of *boiling* water. This is placed over a steady fire, and constantly stirred until all the sugar is melted. Bring it to the boil, keeping a strong clear fire ; now stir occasionally and presently try a few drops on a cold plate. When these do not stick to the plate, setting hard quickly, it is ready to turn-out ; but before doing this remove the pot or saucepan from the fire, and allow the boiling to subside slightly. It is just now that any medicinal agent, if needed, should be added.

Out-Door Feeding.

I must not fail to notice this question as it is one of considerable importance, and yet just here is a rock on which all hopes of success may often be dashed to pieces. It is at once the most desirable method of feeding, and the greatest of stimulants to increased energy and development on the part of the bees ; while it can also be shewn

as the most destructive to bee-life where all the points to be considered are not well understood.

During the Spring

nothing of the kind should be allowed until the population of the hives has been largely *renewed* by young bees, and then with due care in placing the feeding apparatus in a warm sheltered corner, the result will be remarkable.

At least double the usual quantity of water must be added to the syrup and the feeders placed some distance from the apiary, that robbing may not be induced.

In the Autumn

out-door feeding should not be carried on later than September, and if the supply can be kept warm all the time, it will be a decided advantage. No more bees will then be lost than are old and that will be quite useless, and in any case would hardly live to help winter their colony, while the stores are arranged in the best possible position, and sufficient young bees are brought into existence to place the hives in good condition for Winter.

It is some twenty years since I first practised this kind of feeding, and having tried nearly every way that could be thought of, I have found the

Most suitable Feeders for the purpose

to be large glass or other jars, with porous cloths tied over the mouths, and inverted. Any number of these can be used, turning them down over boards with circular openings cut out, that they may be held in a suspended position. Float feeders and other similar arrangements are sure to go wrong, causing many deaths, but with the above, all is clean, there can be no daubing, and empty

jars can soon be replaced by others, or the whole quickly cleared away should any cause arise for so doing.

Feeding by Syrup-filled Combs in Spring

is another process which requires a degree of caution in carrying out, such as few are aware of. The excitement caused by introducing whole combs of unsealed food before a younger element of life has been created, causes unnecessary flights with its consequently increased death rate among the older inhabitants of the hives. The stimulation is apparent, but the anticipated increase of a youthful addition to the population is not forthcoming; for though almost at the birth, frequently the sadly wanted natural, fostering warmth has been rendered non-existent by a too hasty attempt at stimulation.

Cane versus Beet Sugar.

The average consumer knows little as to the source of the sugar used at his table, or about that in general domestic use, neither does he stop to think what may be the quality of the sweetening substances employed by the manufacturers of jams and similar articles. "Prepared with refined sugar only," is the stock phrase offered by the makers as an inducement, to the public ignorant of their methods. There is probably no jam now made, or marmalade for that matter, with pure cane sugar. Not only is beet sugar used, but generally a poor quality at that, with the addition of "glucose" to give it "body," or that firmness so well known in bought jams.

Cane sugar in cubes is always quoted several shillings per cwt. more than the best beet cubes, and the latter will always be found quite suitable for bee-feeding, but any class of beet-sugar, loaf or moist, less than the very best, should be discarded.

It is more difficult to distinguish between the moist sugars, except that the beets are less sweet, and bees will not touch these inferior grades either as syrup or when offered dry. It is these inferior grades of "refined sugar only," which give many jams that dark muddy appearance. It may not be generally known that good moist sugars make the softest cakes.





CHAPTER XIX.

BUYING, PACKING, AND MOVING BEES.

MUCH has already been explained as to the best time to buy bees. If possible, they should be obtained in hives that are in general use, and can be adapted to modern management. In most cases the seller packs the bees and delivers them to the rail, the buyer paying carriage ; but where many hives are concerned the buyer will find it greatly to his advantage to see them packed and delivered to the railway company.

Though some are more suited to the purpose than others, I have yet to see the hive, legs or no legs, that could not be turned "top-side-down" for travelling ; and all should be so sent as the combs then ride more securely, having their base resting upon the top bar of the inverted frame. Tapes may or may not be fastened round the frames to enclose the combs more securely ; but to dispense with this, where I can make my own selection, I use combs that are well fastened down the side bars of the frame.

Shade must be provided in hot weather, with more ventilation than at other times. Bees are lost more from want of ventilation in travelling than from any other reason, and due provision should be made according to the number of occupants in the receptacle which may be provided. If sacking can be arranged to give shade and at the same time exclude light without interfering with the admission of air, bees will travel and stand confinement very much better than where they are continually striving to get out, and thus to a great extent impeding free circulation of air.

Packing Stocks.

Before inverting the hive, fasten a thin board along the whole length of the hive at the ends of the frames, overlapping these at least one inch. A piece of porous sacking is first to be placed above the frames and held in position by a few tacks till the slips of wood are fixed. With the left hand find where the frame ends come, and with a bradawl bore a hole through the thin board into each bar ; then insert French nails *pressed* not quite home. Screws are to be used with this exception, as little hammering should be allowed for fear of injuring the comb attachments.

We have to provide for a free circulation of air under, after the hive is inverted ; therefore on each upper side, parallel with the frames, thick strips of wood are to be screwed, so that these only will rest on the ground when turned over. The entrance may be closed with perforated zinc before or after as is most convenient. The packing can take place several days before moving, if desired, leaving only the entrance to be closed on the eve of departure. In very hot weather for long journeys additional ventilation should be provided by holes bored

at the sides and covered inside with perforated material, or an additional storey or half-storey can be given under the other before inversion.

By inverting the combs we not only place their weight upon, instead of depending from their base, but also provide that there is free circulation of air throughout the hive above them ; whereas in the natural position the heated air ascending is unable to escape and tends still further to weaken the foundation of the combs.

Straw Skeps

containing stocks should be very carefully treated, when railing a long distance. The skep, after slight smoking is gently turned over on to its crown, a stick, one inch thick, is placed across all the combs, and slightly pressed down. A piece of sacking is tied over the whole, and the skep set with its crown into a common cheese box, or any other receptacle that will keep it from rolling, and all is secured as one parcel with strong string or a cord. The stick prevents suffocation by holding the cloth away from the combs, and also prevents the latter from falling to one side.

When delivered on Rail,

or placed in vans, the combs should always travel in a line parallel with the road, so that with any incline, or sudden movement, they are not thrown to one side. When necessary to tier up the hives, place boards between each set. Plenty of straw is needed to give them an easy motion, but on no account is it to be arranged so that the inverted hives rest directly upon it, though some must be packed between to prevent sliding, or jolting against each other. Place a good layer first upon the floor, spread it out evenly, and then lay boards down ; on these place

the first set of hives ; then straw and boards again, thus always keeping a clear space under the sacking next the frames.

All covers and odd material must be packed separately, and where the stock hives are simple square boxes, with no projection whatever, the entire process will be more satisfactory and expeditious.

For Export,

additional care will be necessary, while a sponge must be provided at one side in a perforated box, with directions requesting that the same may be moistened occasionally ; or a zinc vessel may be supplied with a cotton wick held in a funnel reaching nearly to the bottom that the water cannot be spilled.

It may be necessary, according to the strength of the colony, to give an outer case, thoroughly ventilated to provide for excessive heat ; though when it is known that bees have to undergo a high temperature, a nucleus only will travel far better and give more satisfactory results than a full colony.

On receipt of the Bees,

they should be placed out where they are to stand permanently. The packing need not be removed for a day or so, but the entrances are to be opened as soon as the bees are a little quiet. Do not liberate each hive in rotation, but go from one spot to another as far distant as possible, and so let the first quiet down before a neighbouring hive is opened.

It is well not to examine the interior of the hives until the bees have first noted their location ; but it will then be necessary to determine if any queens have been lost, which frequently is the case. Where any are gone it will

be desirable to unite to others at once if this happens to be the first stock of the apiarist ; but when other colonies are on hand one may be able to insert another rather than unite.

Moving Bees Short Distances.

I am frequently asked how it is possible to move bees only a few hundred yards from their old location. Of course it is a very easy matter to shift them only a few yards by easy stages, while actively flying, but in the above case when they can not be moved in winter, it will be necessary to make artificial swarms from them ; uniting two swarms with one queen, and then uniting the two deprived stocks with the other queens. Thus the united old stocks can be moved at once to their destination ; and on the second evening the doubled swarm may also be moved, but this should go into a cellar or other darkened room until another two or three days, and set out towards evening, with a board reaching partly over the entrance.

An alternative plan which would not work quite so well, would be to move the stock towards evening, and when in position, shake all the bees from the combs on to a wide board reaching up to the entrance. Bees treated like this will often stay like a new swarm.

Packing Queens.

An admixture of honey and sugar, first mentioned in Rev. L. L. Langstroth's book as a substitute for honey in wintering, was afterwards used by Mr. I. R. Good, another American, in queen cages when transmitted by the post. However, perfection had yet to come ; the food was right, the candy was "good," but until the introduction of F. Benton's mailing cage, general success was not

attained. Queens may now be sent by post just as safely as an ordinary letter, and Benton's cage has rendered the system absolutely perfect.

The Benton Cage

consists of three compartments ; one is ventilated for general accommodation, and particularly for advantage to the bees under high temperatures ; from this a small passage communicates with the central compartment, otherwise having no ventilation. The last has another small opening leading into the third space wherein is

The Food,

which is made by thoroughly incorporating with finely powdered loaf sugar just sufficient liquid honey to form a thick paste ; this should be almost dry, and give no sign of "running" under any temperature.

It is best made up some time before actually required for use, so that any excess of moisture may descend, leaving the upper portion just right for the cages. When the compartment is filled a sheet of wax or a piece of parchment covers the opening, while a thin lid of wood fits over the whole, being secured with brads or tacks. (See Fig. 55.) For long journeys abroad duplicate compartments are needed, with also a few more bees.

Inserting the Bees.

The lid is first to be tacked on only at one corner, at the side of the food compartment. Hold the cage in the left hand with the thumb on the lid just above the ventilated chamber, and now pick from the combs about a dozen young bees with the right hand, inserting them one at a time while the thumb moves the lid back to receive each in its turn. The queen is to be put in last to make

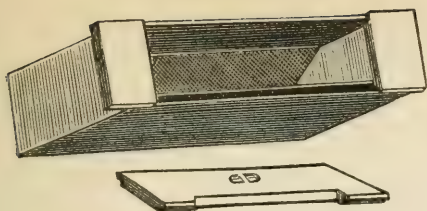


FIG. 54.
Champion Frame Syrup Feeder.

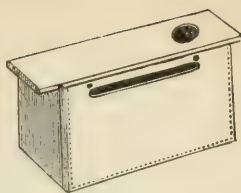


FIG. 54a
Simplicity Frame Feeder.

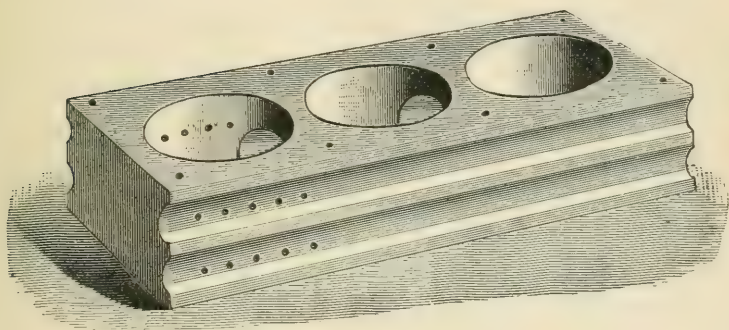


FIG. 55.
Benton Queen Postal Cage.

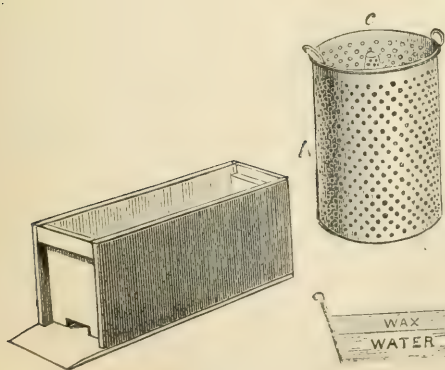


FIG. 56.
Nucleus Hive.

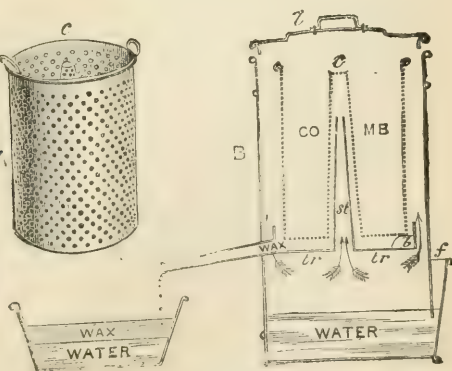


FIG. 57.
Sectional View of Wax Extractor.

sure of no mistake, when the remainder of the tacks can be driven in.

If the weather is cold more bees must accompany the queen, and additional warmth may be given by outside packing, though this is seldom necessary with Benton's cage. Instead of the brad holes I have found a sawcut through the end more effective for ventilating in hot weather.

Packing Swarms.

A "rough-and-ready" way is to tie a piece of strainer cloth over the mouth of a skep in which the swarm may have been taken; but for long distances something more substantial is necessary, and a frame of honey will be required.

The box must be as light as is possible consistent with strength, and ventilation should be given on at least two opposite sides. I have had very good results with air space all round the top, the lid being raised and secured to the main body with perforated zinc.

Swarms should always be purchased by weight, and the buyer ought to insist upon receiving no other. There are 3,500 bees to the pound, and four or five pounds would give a good working swarm. The plan of offering swarms containing so many thousand bees, when in reality not more than a third of the number make up the swarm forwarded, is becoming a thing of the past, and I do not suppose many would be caught in the trap now; nevertheless, swarms of no guaranteed weight are still advertised, and it is time bee-keepers set their faces against the practice.

Weighing Bees.

Where natural or other swarms are weighed after clustering inside the travelling box, they can be first secured.

and carried to the scales, and the weight marked upon the label. If they have to go a long journey, either place a feeding bottle over the zinc until starting or see that a frame with sufficient sealed stores is fixed in before the swarm is hived ; the weight of such comb and the box to be noted, and presently deducted from the gross weight.

Where a definite quantity is ordered, the scales are to be carried to the hive by any convenient arrangement that provides correct balance ; take the weight of the package, and if the opening is not wide enough to admit a comb end-way, use a funnel lined with zinc. Now make sure of the queen and then shake from the combs the necessary quantity of bees, and insert the queen last of all ; close at once and pack for the journey.

They are to be first smoked in the usual way, and all the time they do not miss the queen, the bulk of the bees shot into the box will remain simply clustering on the sides. The operation should take place early in the morning or towards evening as the bees are more restful, and they can be put up in less time as there are more at home. Give food if necessary as before.

I consider the most satisfactory way and the more profitable to the purchaser when wishing to establish a stock of any new variety is to get them in

Three-frame Nuclei ;

but I do not mean such as are often sent out, and as some I have myself received from abroad with not enough bees to cover one of the frames ; but such as can be built up with little trouble by the receiver.

To make up a fair nucleus of three frames, take from a strong hive all the bees from one comb, and one comb full of brood where young bees are rapidly coming forth, with all the bees thereon. Place the brood comb at the centre

of the small hive, the other bees having first been shaken in, and look up a comb partly stored to place on each side. Screw the lid down after inserting the queen ; place wire nails through into the frames at each end, and invert as for full stocks. Strong combs should be selected, and sufficient ventilation given without danger of chilling the brood.

The frame of hatching brood will presently give enough bees to cover three combs, so that with the other bees a queen gets a good start, though if the apiarist has them to spare, another comb of brood in like condition added every seven days will do wonders in building up a full colony.

Standard Colonies

of definite quantities are now offered for sale, and are far more reliable than stocks bought in the old 'hap-hazard' kind of way. For so many combs offered, one may rely upon having that number covered with bees, and all except the two outer combs pretty well filled with brood. Thus a six-frame stock should have four frames of brood, an eight-frame six of brood, and so on. These may frequently be supered within a week or ten days after receipt.





CHAPTER XX.

HOUSE APIARIES, STORE ROOMS, &c.

IT would be a difficult matter to give hard and fast rules for putting up buildings to suit every bee-keeper who owns a large number of colonies. One may have premises that with little or no alteration suit his requirements. Another may have no room to put up convenient sheds, or the situation is such that any given plan could not be carried out.

I will therefore give ground plans of buildings, etc., which I have found to be convenient, and the reader may then make such modifications as may suit his own particular requirements, having the general idea in mind.

The Building

as Fig. 58, is put up with 3-inch by 2-inch scantling as the framework, and $\frac{3}{4}$ -inch by 6-inch boards, matched and beaded. The roof leans to a stone wall at the back, and is there 10 feet from the ground. The front of the main shed is 6 feet from ground to roof; the outer store about 4 feet at the front.

The Workshop

is 20 feet by 12 feet, with communication to the apiary at D, passing a shallow water tank which is constantly

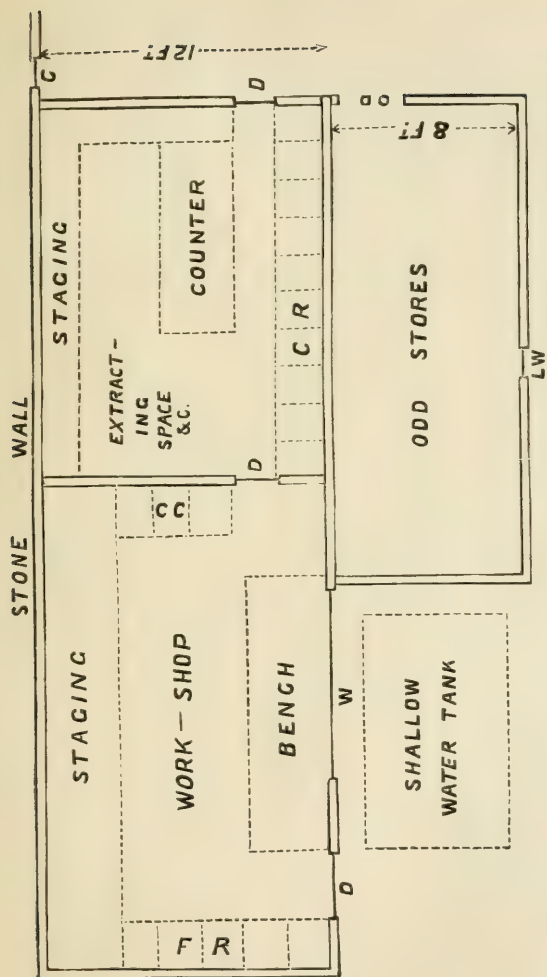


FIG. 58. Plan of Workshop and Store Rooms.

supplied, and has cork dust floating on top for the bees to settle upon. This article, recommended by a correspondent in the *British Bee Journal*, is more satisfactory than anything I have tried for the purpose. Only the coarser material is used, after the fine dust is sifted from it.

The plan, to a great extent, explains itself; F R are frame-racks for hanging up frames as put together, or foundation when inserted ready for use. C C are closed comb-cupboards, with ventilation through the hinged doors at both top and bottom by auger holes covered with perforated zinc. The bench stands in front of

The Window,

the panes of which are in one piece, and *do not reach the bottom of the frame* by $\frac{1}{2}$ -inch; thus, when combs are first taken into the workroom any stray bees soon find their way out, as also at any time. To prevent them returning, perforated zinc is tacked outside along the bottom of the frame, and reaching 6 or 7 inches above the said opening, with a space of $\frac{3}{8}$ -ths of an inch between it and the glass. The above arrangement with fixed windows I prefer to any revolving sash, because a room may be left for days together, and the bee-keeper knows that not a bee will lose its life in the vain endeavour to escape, as with the other which needs constant attention to prevent much loss. "Why not have the opening at the top of the glass?" is a frequent query. Simply because in practice it does not answer.

From the workshop we pass into the

Honey Room,

where by the passage from end to end the recess is occupied by frame-racks which will accommodate several thousand frames, empty combs, or those stored brought

in from the apiary for extracting. At the other side of the passage we see the counter ; with staging on two sides near that, where crates of both bottled and comb-honey can be stored.

The open space gives room for extracting, arranged with or without a stage to assist in drawing from the extractor, as the apiarist may desire. Passing the other door, **D**, we again look upon a portion of the apiary, with the gateway **G** leading out of the premises. **O D** is an open doorway to the store for odd materials, timber, etc. The latter may be placed overhead in the workshop for greater convenience. **L W** is a latticed window, giving all the light required besides the open doorway. The honey room is lighted by a window in the roof, having no arrangement for clearing out bees as this is done in the workrooms before our honey is taken in, and every care is taken to keep out any intruder, while at the same time a thorough change of air is provided.

The floor of the honey room must be concreted, but the other is not of so much importance. It is sometimes recommended that a paraffin stove be kept burning in the honey store, but with the skylight sufficiently large, the heat of the sun will be quite enough to complete the ripening process, taking care that it does not shine directly upon the honey.

A COVERED APIARY,

as seen by ground plan illustrated (Fig 59), for 150 colonies, occupies a space 118 feet by 50 feet, being compactly built with the entrances arranged so that no two are alike within several yards. The base of all the walls is a plank, 6 inches by 3 inches, under which is laid a single row of 3-inch bricks as with the building first mentioned. All the framework is of 4-inch by 2-inch scantling and matched

boards as before, put on when dry. The only door communicating with the outside leads first into a closed room, 50 feet by 12 feet. Just beyond the centre we have the honey safe and extracting room, which stands two feet clear of the ground with woven wire on two sides opposite the window. Steps lead to the door, which is carefully fitted, and no bees are able to get in,

The long room has two windows also with the glass arranged that no bees are ever found dead inside, as before mentioned. Stray bees are here disposed of before the honey goes into the safe. Between the latter and the outer door stands a table, 12 feet by 3 feet for general manipulations. On either side with intervening passages are shelves for storing crates and other materials.

The larger shed has a span roof, 10 feet high at the centre, dropping to 8 feet at the sides, and upon turning to the right after entering by the outer door, we can pass into either of the parallel bee sheds, each of which is 8 feet high, dropping to 5 feet on the lower wall. The hives are situated all along inside the south wall, with flight holes cut through, and the outside of the same varied in appearance. Here no glass is used, but shutters provided at suitable intervals.

The Advantages

that can be claimed for a covered apiary are as follows:— The bees as well as the master have shade during the heat of the day at the season most attention is required. Shelter is afforded from wind and rain, so that any necessary work is carried on without hindrance; and lastly the entire arrangement provides for a great saving of time in that all is compactly arranged in the smallest convenient space.

Provision is made for 150 colonies, and nuclei can be

placed in narrow hives close to the walls about four feet from the ground, resting on the central rail of the framework.

Bee-houses so-called,

but being merely cupboards, with two or more rows of hives, leaving neither room for tiering nor ordinary manipulations, are not worthy a place in the modern apiary ; moreover, no arrangement in larger houses can be in any sense convenient where an attempt is made to arrange an upper and lower row of standard hives.





CHAPTER XXI.

THE PRODUCTION OF WAX;

AND NON-USE OF FOUNDATION.

THE more one studies the matter the more is he convinced that wax should be a profitable product of the apiary. We have been told over and over again that the bees consume 20 lbs. of honey while producing 1 lb. of wax therefrom. Upon the face of it the idea is merely theoretical, as in the first place it is ridiculous to presume that an article costing, if we say only 5s. (20 lbs. of honey at 3d.) could be sold for 1s. 6d. Supply and demand regulate prices, and, as a matter of fact, wax is comparatively scarce, therefore the question of cost should be set at rest once and for all. In bringing the matter to a

Practical and Definite Conclusion,

I built a frame house, fifty feet long by ten feet wide, and covered it with calico, so that the bees could not get out and would only fly in that space. There were several important factors to be considered; the bees experimented with had access to both water and pollen, but no brood was allowed at the time. The experiment was carried out where the bees were not confined to the hive,

and they gathered no other food than that supplied to them for the purpose. A test of this kind should be carried out under a high temperature, and a fair swarm used for the occasion, but in my own case I had to be content with rather a low temperature but the result was very satisfactory, and I found that no more than $6\frac{1}{2}$ lbs. of honey is required in the production of a pound of wax.

Aids to Production.

The apiarist who has all the colonies and all the combs he requires is the one who will make the production of wax profitable. He will have a great deal from cappings in extracting, and many an odd piece, all of which should be placed in some convenient receptacle till enough is obtained to run down. There are the queen cells even ; shavings from combs when reduced to brood thickness in spring ; also the scrapings from the tops of frames, not including the propolis.

Then, again, new worker combs can be produced in spring between the others containing brood, while feeding dry sugar, at a great saving over foundation ; the apiarist then being able to run down his more irregular combs, or those that are getting too old ; or, as is sometimes the case, the wax being perished, such would only be torn down by the bees, as they do not appreciate combs that have been out of use for a whole season ; and if possible all should be passed through the hive every year to keep them in good order.

During the season that bees are storing heavily I have reason to believe that the secretion of wax is continually going on, and if the scales cannot be utilised they are allowed to drop and be carried out as so much refuse. Now the space allowed by my system below the brood chamber provides that full employment shall ever be

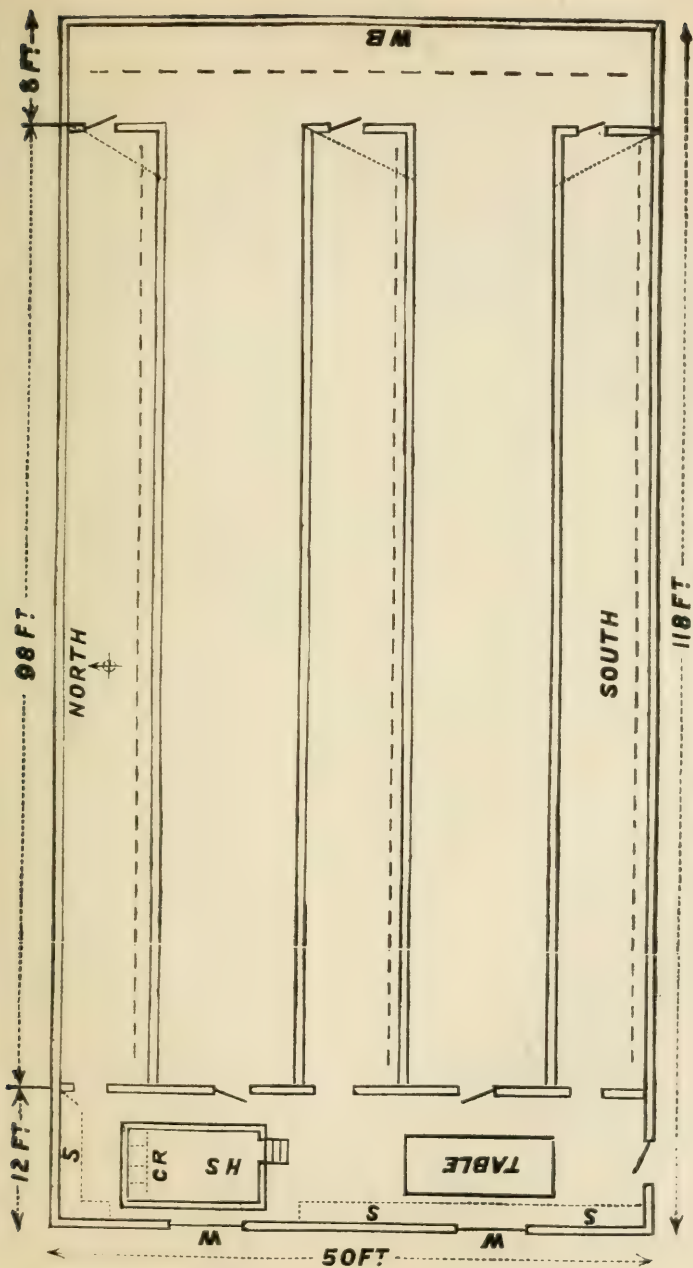


FIG. 59. Ground Plan of Covered Apiary.
 W Windows. S Shelves or Staging. H S Honey Safe, Extracting Room, and Store Room.
 CR Comb Racks. — Position of Hives. W B Wind Break.

given should it happen from any cause that the supers are not removed in due time and the bees there kept busy. Thus we have another step towards the production of wax. When one desires

To Produce Wax in Quantity,

which can only be done when natural stores are plentiful, a colony must be run for extracted honey, and at suitable intervals alternate the combs of brood or stores with starters only in the frames. Between the stored combs these would be built rather thin, but the sealed combs are to be removed and the honey extracted as soon as the new ones are built to about two-thirds of the frame capacity; other empty frames take their place, and so on in rotation. This process cannot be carried out to any extent between brood combs, except as described for spring work or when a young queen presides over the colony, otherwise some drone comb will be built; and the production of useless drones shows a great defect in management.

Another plan, by which a large number of colonies can be kept and much wax produced at little expense of labour, is to place several chambers fitted up with starters under the brood nest early in May. The bees will gradually work down, and the production of brood will be regulated in accordance with the amount of income, and no trouble with swarming will be experienced.

Crowded Nuclei for Comb Building.

The most economical plan for producing even and useful worker combs is that of arranging small colonies of three and four combs with vigorous bees and queen. Shift about occasionally, making nuclei on the old stand to dispose of the older bees and so prevent the clogging

of combs with honey. Keep all closed up warm and feed gently, but always. Put in a frame with narrow guide only, and in three or four days such colonies will produce a beautiful worker comb nearly filling the frame and being generally crowded with eggs. These may be utilised as required, and the same process continued. For three months at a stretch such small (carefully-tended) colonies will continue the process, giving something like two dozen good combs, while the brood removed will represent two powerful stocks. Such a profit, and saving of outlay in foundation, should satisfy the most economic bee-keeper.

The Production of All-Worker Combs

is assured where all young bees are retained, hence the reason for shifting the nucleus occasionally. In that case a young queen is not a necessity. Where swarms have been hived upon starters, I have avoided the building of drone combs by placing the frames rather less than $1\frac{3}{8}$ -inch from centre to centre. This point appears to have been overlooked by many who have been troubled in that direction.

Pollen Stored in the Sections.

This trouble I learned to avoid when hiving swarms upon full sheets of foundation in my endeavour to get the best work started in the sections. Just as I hived swarms upon foundation (when made by division), I now put them upon starters, with the addition of two combs of brood ; one with uncapped larvæ, and the other having brood hatching. Thus the bees have room to store the pollen carried the first day or two, without spoiling the partly finished sections when they happen to be removed from the old stock to the swarm ; and what is of equal impro-

tance, there is just sufficient brood to make up for wear and tear before a general hatching would otherwise take place. Moreover the queen is kept below without the useless and expensive addition of excluder zinc generally used where starters only are given under the sections.

When Swarming,

my plan is not to throw the bees entirely into the sections as soon as they are hived, but simply to prevent the production of an excess of brood in the height of the season, and with the two combs of brood so arranged the colony is worth wintering after the season is over ; whereas in the other case several have to be united to get a fair stock. But, I am told, the bees will not work in the sections with so much room below ! Have I not already shown how full stocks will do so with plenty of room under or in front of the stock combs ? And if your bees will not go into the supers, when they are strong enough and honey is to be had, do not wait for their pleasure, but *put them in* by either of two ways.

To make the Bees go into the Sections,

first secure the queen and cage her above the sections for a few hours, and when you go to the hive you will find the super crowded ; remove her quietly and let her go in by the entrance. Another plan I have found successful is to place the crate on a sheet of paper on the ground, raised on one side that the bees may draw under, when many of the bees are to be shaken off the frames close to the same when they will cluster in the sections. They may be thrown on top without lifting the crate, and though some will of course return when the super is replaced, our object is accomplished.

This is best done towards evening, and when desirable

to add other swarms within a few days, these can be hived in upper crates without their queen.

All the above has reference to the profitable production of wax, and I shall be excused for bringing these particulars of management in here, more particularly as the whole question has received but little attention from bee-keepers generally.

When Foundation may be used to advantage.

Now I do not consider that foundation is always used in the stock chamber at a loss ; in fact it can be adopted at considerable profit when extension of stock is the object.

A bee-keeper may wish to largely increase his stock of both bees and combs, and then considerable time will be gained by taking advantage of foundation ; though it should be borne in mind that increase is obtained at the expense of honey.

When the honey season arrives we have to be prepared with plenty of storage room, and therefore nothing less than full sheets of foundation can be tolerated in our sections, while if already drawn out in preparation for the harvest, the results will be far better. If suitable foundation with a thin base is used there will be no difference to be distinguished between such combs and those built from starters only, while the appearance of the surface when capped will be much better than that of those so often finished off with drone cells.

While the profitable production of wax will be carried out by those who have completed their stock, much will depend upon locality, as well as the culture of bees most suited to the purpose.

Wax Extractors.

Solar wax extractors are frequently used, with a large surface of glass, on a frame ; all being air-tight, enclosing

a perforated vessel to take the wax and a pan under, but these are not so satisfactory as those worked by steam. A cross section of a suitable wax refiner is shown in two sections. A piece of fine flannel should be stretched across, under the perforated comb holder **A**, thus thoroughly refining at the first operation. The wax running on to the false bottom passes out by the spout into a convenient receptacle. When it is required to work from a steam boiler, the steam pipe should enter just above the water line shown, and no water will be required below, as when placed over a stove. The wax will be of still finer quality if the vessel it runs into contains warm water.

The illustration is that of the late Mr. Cheshire's pattern, and is manufactured by Mr. Meadows, of Syston. (See Fig. 57).

Cost of Producing Wax.

My experiment was conducted during the Autumn of 1886 in a large flight room, 50 feet by 10 feet. A swarm of nearly 3 lbs. weight was made up and given eight frames, with a slight line of wax as a starter to each. I determined to avoid the complication that would arise if brood were produced, but at the same time it was necessary to have a fertile queen presiding, or the bees would not work to the best advantage. The new combs were therefore removed every three days, and though occasionally eggs were to be seen, no food was consumed in their production other than that fed to the queen. The removed combs were placed behind the division board, and were emptied of thier contents by the bees, to be again used in building new combs.

Thus without extracting, the combs were taken away perfectly dry, with the exception of the three last built and to make sure of wasting none of this remaining honey

the combs containing [it] were run down in a vessel with no added water. The bees had access to both pollen and water while building, and from 6 lbs. of honey fed to them they gave $6\frac{1}{4}$ ozs. of clear wax, with a balance of 15 ozs. of honey left over. If I say an even pound left I shall be nearer the mark, as the bees had the means of loading themselves much more heavily than when the swarm was made, as they were then forced to consume what they had before commencing to build. Five pounds therefore giving that quantity of wax, it would be supposed that it takes $12\frac{1}{2}$ lbs. of honey to yield a pound. But our experiment is not yet completed ; the bees had to live during the twenty days taken to carry it out. Being in a confined area during autumn when the weather was far from being as warm as could be desired, the expense of production would be very much more than when new combs are built in the height of the season. The bees did not get on so fast, especially as the best combs were removed in time to prevent the production of brood, and towards the last the supply of honey became very limited.

To Get at the Cost of Living,

after removing the last of the combs and balance of the honey, the bees were given just 1 lb. of honey in a feeder arranged so that they would not get it fast enough to go on building. After the fourth day there were 6 ozs. left ; but here is a little difficulty ; they could not require 10 ozs. in that time, and on removing the feeder with balance of honey, and giving four empty combs they put about 2 ozs. into the cells. This would still leave 8 ozs. consumed, or 2 ozs. per day while in active flight. Then for the twenty days we have 40 ozs. consumed to preserve life, which deducted from the 5 lbs. leaves 2 lbs. 8 ozs. actually used in producing the $6\frac{1}{4}$ ozs. of wax ; thus, to

produce 1 lb. of wax $6\frac{2}{3}$ lbs. of honey would be consumed. When the cost of living was carried out the bees were reduced about one-third, so that 2 ozs. per day should be within the mark. In the height of the season with everything favourable it is only reasonable to say that the cost of production is really much less, and probably less than 5 lbs. of honey are consumed in actually producing one pound of wax under natural conditions.

Comparative Cost.

In the course of the experiment I found that about eight standard frames (14 inches by $8\frac{1}{2}$ inches) of new comb will give one pound of refined wax. It is surprising what a large amount of refuse is left after melting the most beautifully white combs, so that the actual weight of wax obtained is much less than that of the original combs. *Observe this* : one pound of wax, costing the producer less than 1s. 6d., fills eight frames with finished comb. To do this with foundation $1\frac{1}{2}$ lb. of that article is required, costing in hard cash at the least 2s. 6d. for the base only ; to this the bees add considerable of their own production before the combs can be completed ; making the total cost much over 3s. Facts are stubborn things which cannot be ignored, and the bee-keeper will do well to consider if he cannot best produce wax by saving the cost of brood foundation rather than attempt to make his bees manufacture it for sale, though the latter might very well be done in tropical regions, or even some other localities where Nature's bounteous hand provides honey by the scores of tons, and the value of it is but small.





CHAPTER XXII.

MANAGEMENT FOR HEATHER
HONEY.

HAVING had considerable experience in former years, between 1870 and 1880, in sending my bees every autumn to extensive heath-lands, and for some years also having an apiary in the midst of hundreds of acres of heather, the information placed before my readers in this chapter will doubtless prove of considerable value. Hitherto no work has given special treatment for the production of heather honey; and yet it is a subject of the first importance to hundreds of bee-keepers, nearly all of whom wish for some better method than they have had for making the most of this late harvest.

Late in the season bees must be close to, or in the midst of, the crop they are to gather from, and in the case of heather large quantities of honey can be, and often are, secured; but in very many instances the stock combs receive, and are totally blocked up with this valuable honey which the apiarist desires to get stored in the sections.

Heather honey being so thick, it is quite impossible to extract it unless removed as fast as gathered, and this is not desirable. It is usual for bees to crowd the stock combs late in the season, as many find to their cost ; but why is it so ? It is not that the nights are cooler, as frequently the temperature at night is much higher in August than during May, when bees work well in the supers. It is not even that the bees are aware that the season is drawing to a close, as many consider ; but if we would go to the very starting point of the trouble, we shall find that

The whole question centres upon the Queen,

as every bee-keeper may prove for himself, and as he will admit as he follows my statements.

Now, what is the condition of the colony which goes first into the supers in early summer ? Have I not already shewn that the hive must be full of bees, and have every stock comb *literally crammed* with brood, when the honey *must* go into the sections ? Well, go and do likewise for your heather crop ! Imagine that you have another year, a new season coming in, instead of a late season in the same year ; and then you will have your honey where you want it.

But, you say the bees will *not* breed to any extent late in the year. True, the same queen that you have used all the summer will be of no use to you in this emergency, and just here is the point. You are, then, to

Use a Young Queen,*

and the best way to have one in readiness for every hive is to follow my plan of using every tenth colony for nuclei as already shewn. Your first harvest closes towards the

* See also Simmins' Non-Swarming Pamphlet (Feb. 1886).

latter part of July, and as soon as the supers can be removed, dethrone the old queen and unite the stock and nucleus. You now have a stronger colony and a young queen who will take good care that her domains are not crowded with honey. *Her* first season is just coming and the bees will act accordingly.

This is a special case and special treatment is required, as the honey nearly always comes in so freely that, by the old method, the already exhausted queens are soon crowded out, and by the time the earlier harvest is over, the workers are worn out; whereas with the young queen we have a good stock left, with bees still hatching to make up for the tremendous loss of life. More honey is accumulated because the population is larger and does not decrease as only too frequently has been the case.

Of course, only worked-out combs are to be used in the sections, including those not completed from the first harvest, after being cleared by the extractor. At the termination of the earlier harvest if any stores are left in the stock combs, the same should be extracted, and in

Uniting with the Nucleus,

only those combs most crowded with brood should be used. The odd combs of brood can be given to one or more lots left at home. Some reader may say that his hives *are* crowded when his bees go to the moors. They may be, but like the queen such bees are already exhausted by their previous labours, and new blood is required throughout if one wishes to make the most of this last important harvest.

If necessary feed "from hand to mouth" after uniting, until time for the heather, but on no account feed heavily, as once advised by a correspondent in the *British Bee Journal*, who hoped thereby to fill up the space the old

queen could not occupy, expecting that the heather honey would all go above, and that when the bees came home they would require no more feeding. True indeed, for there would in many cases be no bees to require it. How utterly inconsistent, to add wear and tear without compensation in young workers, when the whole energy of our bees should be reserved for the storage of this last crop! And how very injudicious to crowd the queen out at the very time we require one that will still further extend the brood nest in preparation for the good time near at hand.

Moreover, it is a fact no amount of false reasoning can gainsay, that where heavy feeding is done just before supering, especially in Spring, the *greater portion* of the syrup thus fed *is stored above after the sections are put on*. Thus the result is both delusive and dishonest.

On the other hand, the process is so much like killing the goose to get the golden egg, that one should bear in mind the fact that heavy feeding causes the destruction of brood which the bees at this period do not hesitate to remove for the accommodation of stores thus forced upon them, so that not only does the beekeeper add wear and tear without cause, but actually gets rid of many young bees which should have been relied upon for his heather harvest. A young queen, the union of forces and just a sufficiency of stores, are as necessary now as when preparing for the first honey flow of the season.

When Moving to the Heather,

everything should be got ready and loaded on the vans over-night, and if not desirable to travel during the night the journey ought not to be delayed later than 3.0 a.m. Upon reaching their destination the hives should be treated as before shewn after a journey.

The Supers should Travel Separated

from the hives, and be arranged in position on the next day after the bees have been liberated, or on the same day as soon as the bees are settled, if inconvenient to attend next day. Each stock should have an extra chamber for better ventilation, and all openings for the admission of air must be shaded, so that there may be as little excitement as possible to exhaust the bees.

My "Tenth" Method

of providing a young queen for *every* hive *yearly*, uniting at the right time; *i.e.*, before feeding up where there is no late harvest, or just before a late gathering is expected, will also prove invaluable in many places in the States of America and other localities where the gathering of stores so late as September, and sometimes in October, leaves the bees totally unfit to stand the rigours of winter, through the queen that has been used all the season failing to keep up the necessary supply of young bees.

The young queens are not to be raised before July, while in some instances it may be desirable to have them come on in August when the last flow is extra late.

After uniting, the capacity of ten or eleven standard brood frames only should be allowed during the late harvest, and no empty chamber will be required under or in front of the same, as no swarms will issue with the young queens.

Another Plan.

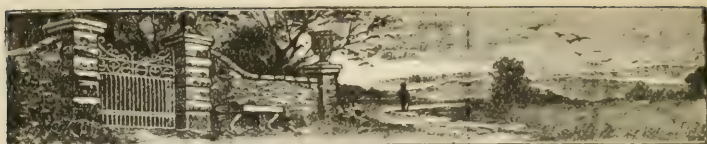
Where one will not take the trouble to raise young queens for the purpose, and desires to make use of the heather honey stored in the stock combs, such must be removed one or two at a time and placed in another chamber below the brood nest after having the cappings

sliced off, when the stores will be carried above provided the sections are filled, not with foundation, but combs already drawn out. In long hives such removed combs should be placed behind the division board.

Honey Presses

are much used by those obtaining heather honey, which as before stated, is so thick that the extractor is useless for removing it from the combs. At the same time it is desirable that old combs containing pollen and other extraneous matter should not be passed through the press, at least when the honey is intended for sale.





CHAPTER XXIII.

DRIVEN BEES.

WHERE these can be secured in Autumn the general rules laid down for management of ordinary stock will, of course apply in their case.

There are, however, a few minor matters that require attention, especially by those who have had no practice in this undertaking. Where the surrounding cottagers are willing to part with their bees instead of killing them, the general way is for the bar-framist to have them for his trouble, but on no occasion should he give more than one shilling for each lot, or they may turn out a dear bargain.

How to Carry the Bees.

By using lightly-made straw skeps, the bee-keeper can carry eight or nine around his shoulder, slung on a broad strap. Thus by uniting, after driving, two or three lots into one, I have been able to carry home the bees from a large number of cottagers' skeps, over a distance of four or five miles where no trap could go. When a conveyance can be taken, light well-ventilated boxes can be used to greater advantage.

As soon as the bees are driven from their combs, secure

them at once by tying a porous cloth over the mouth of the skep ; and when two or three are to be placed together, let them be united as soon as driven, first securing the queens not wanted that a young one may preside. If there is any use for other surplus young queens, place such in Benton cages with a dozen or more workers each.

The Novice

should always begin by driving a skep or two of his own at home, and never attempt to practise first on the property of others, not only for the sake of his neighbour, but for his own and that of bee-keeping generally. After some experience in driving, then Mr. Lyon's "Bumping" process can be followed to advantage in many cases, though driving will often be more satisfactory, as being less inducive to robbing, there being no broken honey to excite the bees.

To prevent robbing it is sometimes advised that all hives not being operated upon are to have their entrances closed with a bunch of grass inserted lightly, that ventilation may not be impeded. Where an outhouse can be utilized, however, there is no need for this operation.

Attention has already been called to

Foul Brood,

and the bee-keeper should be on the watch for this when he may be taking bees. Where this disease is discovered the bees will be perfectly useless, as probably it would have developed during the spring, and the remaining occupants of the hive will not pay for their carriage home. Tell the owner of the condition of the bees and get him to smother them the same evening by the old plan, both for his own sake and the benefit of his neighbours. The whole skep must be burned ; and do not fail to impress

him with the importance of leaving none of the honey in any way exposed.

When to Hive the Bees.

One is so often told that it is desirable to place the bees in their new hive the same evening they are brought home, that I think it necessary to show how robbing need not occur, even if combs wet from extracting are given to them at the middle of a warm day. It is considered that when put in during the evening all the bees congregate to the hive, but they would not in the daytime, besides being liable to get robbed out.

The fact is, with cool evenings often experienced in autumn, many bees are lost by not being able to note their location; whereas in the middle of the day they gradually settle down to the one spot like a new swarm and not one is lost, while the bee-keeper is able to find his extra queens, and is in no trouble about darkness coming upon him before he has half finished.

Place the Frame-hives in Position,

quite empty, and shoot in the bees, taking care that only one queen is left to preside over the two, three, or more lots united. Now get your stored combs or those fresh from the extractor, and arrange them in position; put on the quilt and cover all securely, leaving the entrance several inches wide. As the stored combs are given just before closing no robber bees are on hand; but where empty combs or foundation have to be inserted, feed carefully until the hive is well supplied.

Taking average lots, the number to put together to make a fair stock should be as follows, according to the manner in which their house may be furnished—with

stored combs, two swarms ; with empty combs, three ; foundation, four.

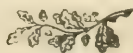
Uniting to other Stocks.

A wasteful plan, which results only in loss of bees and time, is that of adding driven bees to weak colonies at home. Without considering that fighting is certain to cause the death of thousands in the hands of many bee-keepers, but too frequently these bees only die out before winter is half over, leaving the stock worse off than before.

To be in any way satisfactory for this purpose the driven bees must first be made to develop a fair-sized brood nest in another hive on the spare combs of such lot ; when plenty of young bees are hatching *then* unite to your weak lot, saving the queen most to be desired. Feed and prepare for winter as hitherto shewn.

Plumping.

The Author's system of 'plumping' will be found highly beneficial in building up driven bees. Under the usual conditions there has always been great difficulty in inducing the bees to develop a brood nest of sufficient extent to compensate for the loss of life in storing the necessary food for winter.





CHAPTER XXIV.

HONEY ;

ITS USE IN HEALTH AND DISEASE ; AND NOTES
ON GENERAL HEALTH.

HONEY is a truly wonderful gift of nature, and stands almost alone as a pure natural sweet, perfect in itself. There are very many who have the impression that bees *make* honey ; but this is far from being the case. Flowers *secrete* nectar under the chemical action of the atmosphere upon the juices of the plant, and this process is continued daily during favourable weather until the bee while *gathering* such production is the means of mixing the pollen of different flowers, almost invariably of the same kind, and thus being fertilised and the plant made capable of reproduction by seeding, the object of the sweet attraction is accomplished ; the flower fades, and the nectaries are dried up.

Some writers consider that nectar as gathered, is next digested by the bees and so converted into honey ; but it is more reasonable to conclude that the ripening of the fibres of plants, is the actual basis of honey, whereby starchy substances are converted into sugar under a naturally maturing process, just as we know the same

routine takes place in the ripening of fruits and vegetables. With plants generally the change is more marked under the processes of fermentation by heating, or digestion by animals.

In the case of the sugar of honey, heat is the great ripening and productive agent. A high temperature always ensures a rapid flow towards the plant's flowery mouths and tempting lips, encouraging the bees to frequent visits; while a lowered temperature is found to immediately check the flow.

The Crude Nectar,

on being disgorged by the bee from its honey stomach, has then imparted to it an additional preservative quality as even now it does not form honey as we use it. The newly gathered liquid is distributed over as large a comb surface as the number of vacant cells will allow; and thereafter the heat and ventilation afforded by the prosperous condition of the colony at the time, together with the constant circulation of air maintained in a systematic manner by the vibration of their wings, kept up by a regular force of workers, in due time ensure the evaporation of all excess of moisture. The honey then being ripened is gradually shifted to the upper and outer margins of the combs, where the cells are being purposely lengthened for storage (or to the super space when provided) and ultimately capped over, as filled.

Medicinal Qualities.

Honey requires no digestion, but enters immediately into the system; it is productive of heat, and by its regular use, the entire organism is benefited in a high degree, as it not only stimulates the appetite and aids digestion, but is at the same time better than any medicine for regulating the system.

- Persons inclined to be costive, especially children, will find honey restore them to a perfectly normal condition ; while the continued use of purging medicines on the other hand causes a distressing reaction, because each dose impairs the delicate and marvellous membrane lining the stomach ; whereas the only rational course to pursue is that of endeavoring to restore the already injured or relaxed parts.

Persons in fear of Consumption

have received great benefit from the constant use of honey. Instances are on record where people have been quite cured by it ; while others past all hope of recovery have enjoyed many years of life they had ceased to hope for or expect.

Experts have found that most people, at some period of their lives, are affected more or less by the action of the microbes peculiar to consumption ; but the greater proportion of mankind fortunately do not succumb to this malady. It is really wonderful that so many do escape self-destruction, when we consider the numerous class of people who deliberately shut themselves into a bedroom at night, to breathe the same poisonous air over and over again during the hours of darkness. And yet these same good people would be horrified if they could but fully realise how rapidly they are travelling towards destruction ; that the lungs are simply choking for the want of that life-giving oxygen so soon consumed in a closed room, and which the blood is asking for at every fresh breath. Breathing vitiated air feeds the dread microbe, and encourages it to take up its permanent abode, while each succeeding cell of the lung thus slowly destroyed is never replaced. A reasonable supply of fresh air, and a rational diet of nutritious foods, including fruit and honey, should

go far towards maintaining that pure state of the blood which defies microbes of all kinds.

A very distressing malady which will seldom yield to allopathic treatment is that known as "gravel." Honey taken daily is said to effect a cure, and I am quite sure those tortured with this complaint will not fail to avail themselves of such a simple remedy.

For colds, coughs, and sore throats, I suppose there is hardly a household but has had some experience with the use of honey either alone, or mixed with vinegar, lemon juice, or even butter, in case the palate does not appreciate the pure article alone; but for

Definite Treatment

the following instructions, if carefully carried out, will prove more efficacious than any system of drugging, because 'Nature' is judiciously assisted in her well-known endeavours to throw off disease; whereas drugs frequently check this attempt, or destroy life entirely.

In the first place, judging from the manner in which honey is generally applied, it is necessary to bring thick ripened honey to a gentle heat after adding a little boiled water. Whether granulated or not, and particularly if in the former condition, full benefit cannot be derived from its use until the honey has been brought back to the same condition as when first sealed up by the bees, and a tablespoonful of water to one pound of honey will generally be sufficient. Newly-extracted honey needs no addition of water, when used at once, as part of it comes from uncapped cells, from which the excess of moisture has not been removed.

For Sore Throat and Night Cough

mix the juice of one good lemon with one pound of honey. stir thoroughly, and take of this one or two teaspoonsful

frequently in connection with the following soothing and always beneficial treatment. At night, upon retiring to rest, fold a large linen handkerchief, and wring it out of tepid water ; lay this right round the throat, and over that several folds of dry flannel. The latter keeps up internal warmth and materially assists in the speedy restoration of a normal condition of the throat. Do not remove the throat packing until rising, and then wash thoroughly with soap and water, cold by preference, but tepid if the person has a weak constitution.

For Bronchitis in Adults,

and in serious cases of night coughing, take the lemon honey night and day, and upon retiring to rest procure a jug holding about two quarts of boiling water. Sit up in bed and inhale the steam with the mouth open, continuing for ten or fifteen minutes, according to the strength of the patient, who must at the time be completely covered with a blanket, or mackintosh sheet by preference, that the steam may be retained. Wipe dry after, and lie down ; repeating the process each night until relieved. Adopt the throat packing also if troublesome. For

Influenza ; Bronchitis in Children ;

for severe cold, on the lungs especially, the supplementary treatment should be :—Bran poultices on back and chest, put on not too hot, and changed every twelve hours for the first day or two ; then use them only each other six hours. It is imperative that several folds of dry flannel be wound round and across the shoulders and chest, over the poultices, as well as when they are not in use ; and the body must be carefully and quickly washed with warm water (and soap) at every change of the poultices. Keep in one room with a fire and the tempera-

ture at 60°; also have the bronchitis kettle steaming all the time.

Without doubt, many cases of severe influenza terminate fatally, where the patient is made to stay in bed; more especially is this the case where poultices are not used in a rational manner for aiding in the removal of the matter clogging all the passages of the lungs.

Like every other part of the body, the lungs require exercise, not only by their own natural action, but also by assistance through the muscular movement of the body. While lying still day after day, the bronchial tubes are becoming more and more corroded; but when an effort is made to rise, even if only for a few hours, natural action immediately sets in, and portions of the strangling phlegm are set in motion by natural expectoration.

Strong acids do only harm, but the mixture of honey and lemon, together with the warm moisture from poultices, etc., will always help on towards a rapid recovery. The bronchial tube is lined with a minute hair-like growth, which is always in active motion, constantly passing onwards and upwards the mucuous secretions of the lungs. These restless agents are destroyed by that inflammation generally known as "sore throat," hence the difficulty in then keeping the lungs clear, and the retarding action of drugs and strong acids so frequently administered. On the other hand, the warm pack, and rationally applied poultices, will immediately raise the vitality and natural vigour of the parts affected.

Sore and Cracked Hands, Chilblains, &c.

For rough skin, cracked hands, itching, spots, &c., the parts should first be bathed with warm water and then well rubbed with honey. If the part is convenient for a plaister the cure will be more rapid and soothing. Take

a piece of linen of suitable size, cover one side with honey and bind it on with strips of linen and flannel sufficient to keep in the warmth. Chilblains treated in this way will disappear as if by magic.

Correct versus Incorrect Application.

Will our friends of the medical fraternity ever understand the true principles of applying poultices, wet packs, etc., to the poor human body? Under their treatment we nearly always hear of the poultice to be put on as hot as possible, and to be renewed as soon as it cools. Now as a matter of fact, a poultice *when correctly applied never does get cold*; and should be so covered up by flannel or other bandages, not too tightly, that the natural heat of the body responding to the soothing warmth of the poultice, keeps all at a moist blood heat for so long as it is desirable to remain on. This principle may the more readily be understood when I state that a person of strong constitution may just as well use cold water for the wet throat pack, for the simple reason that its temperature will at once begin to rise, and the pack will even appear warmer than if he had used tepid water.

In all Cases of Fever

the application of moist warmth, either by a process of wet-packs, or bathing, is a God-given remedy for which the thirsty, choked skin ever craves, but seldom gets under the usual allopathic systems. And what is more remarkable where the soothing hydropathic treatment is carried out the skin does not peel off as is always the case with the destructive drug treatment. The skin is parched because the heated blood has no moisture to spare it, its own circulation being already impeded for the want of sufficient water. It can readily be seen therefore, how

the moisture of the pack or the bath, at one stroke, relieves the pores of the skin, while at the same time it gives back to the blood its needed proportion of water, giving it again that mighty circulation, which restores its purity, casting out its dross, and enabling it to laugh at the fever microbes which are now hustled to destruction with no aid whatever from drugs, which only too surely impede the life-giving circulation.

Just one instance, but I could give many. A patient with fever was given up by his doctors ; the fever had done its worst, and he was to die. But he could just beg to be placed in a bath of warm water ; " What does it matter ? it can do him no harm, after the doctors' hopeless decision." And so he was placed in the bath, when that blessed sleep which drugs and fever had hitherto denied him, came upon him there. He slept for a long time ; he slept on after they laid him back in his bed—and he slept to get well.

I have had several estimable friends among the medical faculty, but it is when one has retired from active practice that he is most ready to speak lightly of the medical practices of that honourable profession. One of the fraternity, a greatly esteemed friend, now retired, asked what medical attendant I had for my family ? After explaining that we never have a doctor in the house (professionally), and relied upon common-sense treatment only : " Well, there is one thing," he replied, " if you call one in it is very uncertain if he will do you any good, but it is quite certain you will have to pay him."

Where one has no knowledge of his own anatomy, and no confidence in himself, of course he feels he must rely upon the medical practitioner ; and it is better that he should do that than to drug himself. Again, there is of course a great responsibility incurred in serious cases of

illness where a doctor is not called in, as whether he is right or wrong, the law upholds his profession, and forces it upon those who are convinced that his practice is founded upon shifting sands which frequently engulf both his patient, and at the same time his faith in his own methods of treatment.

Lifting the Veil.

Dear reader, have you ever read Smedley's book on the Hydropathic treatment? If not, then you can get it from Smedley's Institute, at Matlock Bath, Derbyshire; where hundreds of medical men have gone to regain that strength, and a new life, which their own medicines have failed to restore to them. Yes, and patients by the thousand which they have failed to cure, have been able to return from Matlock, as from death, unto blessed health and life.

Under the heading "Medical Facts," some startling statements were made by Dr. Tyrrell in "*Gleanings*" for November 1st, 1890, page 774. "I used to think," said he, "and am now of the same opinion, that the science of medicine . . . was the root of more evil, suffering, and death, than all other evils combined."

"An old doctor of the 'regular faculty' told me that he did not know that he ever cured a patient, and said that he knew he had killed some, but not intentionally."

"For many years I have admired the candour and honest acknowledgments of Dr. O. W. Holmes. When he said "It were better for the people were all the medicine of the world cast into the sea," he meant medicine used by the regular faculty, such as he had been taught to use. I don't think he meant water, honey, and other domestic remedies."

"An experienced doctor in Louisville, Kentucky, told me

that the people would be better off without than with medicines as he used ; but he said he had to visit patients and they would not be satisfied without medicine."

"Many years ago one of my comrades was sick with fever, and the doctor said he would die, as most of his fever patients did ; but in the night, when the watcher was asleep in his chair, the patient, 'burning up with fever,' tongue and lips cracked open, 'dying with thirst,' reached the pitcher of water and drank all he could. When the doctor came the next morning he was surprised to find his patient better—saved by Nature's remedy, contrary to the doctor's science (?)"

These Remarks

my reader will believe, are not set forth as the dagger striking in the dark, but rather as the lancet used in the light of day, which our friends of the profession employ that it may prick only, in the hope of giving relief ; and I have not any doubt that at least some members of this honorable profession will ultimately agree with me. My only object is to give some relief to suffering humanity, and having myself passed through more than 40 years without seeing the necessity of using drugs or medicine in any form, the foregoing statements may be taken as having a very considerable basis of truth behind them.

Honey as Food.

Though the sweetest of all sweets, honey is not suitable for cooking purposes in such a general manner as sugar, requiring a much larger quantity to sweeten many articles of food, as well as being more costly. There are many things, however, which are much improved by the addition of honey, such as fruit pies or puddings, cakes, &c. ; while a basin of bread and milk is made very palatable when sweetened with it.

The following are among many excellent recipes given in Mr. T. G. Newman's "*Honey as Food and Medicine*."

"FOR PRESERVING FRUIT.--Extracted honey is superior in every way. Add one-third as much honey as fruit, boiling until the taste of the honey has evaporated.

"SUMMER DRINK.—Those engaged in harvesting and other occupations tending to create thirst, will find the following preparation a very palatable and healthful drink in hot weather:—Take 12 gallons of water, 20 lbs. of honey, and the white of 6 eggs. Boil one hour; then add cinnamon, ginger, cloves, mace, and a little rosemary. When cold add a spoonful of yeast from the brewery. Stir well, and in twenty-four hours it will be ready for use.

"FOR COOKING GREEN FRUIT use only extracted honey, which being the only liquid, holds the fruit firm and gives a very rich flavour. Sweeten or season with spices to suit the taste, and cook slowly until done. Serve dried fruit the same, only adding enough water to swell the fruit.

"GINGER HONEY CAKE.—Take $1\frac{3}{4}$ lbs. of honey, $\frac{1}{4}$ lb. of butter, $1\frac{1}{2}$ lbs. of flour, 1 ounce of ginger, $\frac{1}{2}$ ounce ground allspice, 1 teaspoonful of carbonate of soda, quarter of a pint of sour milk, cream if you choose, 3 eggs; put the flour into a basin with the ginger and allspice; mix these together, warm the butter and add it with the honey to the other ingredients; stir well; make the milk just warm and dissolve the soda in it, and make the whole into a nice smooth paste with the eggs which should be previously well whisked. Pour the mixture into a buttered tin; bake it from three-quarters to one hour; take the white of 1 egg and beat it up with a little sweet milk, then brush the same over the top with a feather to give it a glossy appearance.

"HONEY SPONGE CAKE is nice eaten warm, and con-

sists of two-thirds of a breakfast cup of sour cream, 3 of flour, an even teaspoonful of soda, 1 cup of butter, 3 eggs, 1 $\frac{1}{4}$ lbs. of honey, 1 tablespoonful of cinnamon, $\frac{1}{2}$ ditto of allspice, and a little extract of lemon ; mix the spices with the flour ; put the soda in the milk and stir well, that all ingredients may thoroughly mix ; beat the cake well for another five minutes ; put it into a buttered tin—bake from one-half to three-quarters-of-an-hour.

“BUTTER HONEY CAKE is pronounced by all to be excellent. One pint of flour, 1 tablespoonful of butter, 1 teaspoonful of soda, 2 ditto of cream of tartar, and honey sufficient to make a thick batter. Spread out an inch thick, and bake in a hot oven.

“TO MAKE MEAD, not inferior to the best foreign wines, put 3 lbs. of the finest honey to two gallons of water, two lemon peels to each gallon ; boil it half-an-hour, and skim well. Put in the peel while boiling. Work this mixture with yeast, and then put it in a vessel to stand five or six months, when bottle for use. If desired to keep it for several years, add four pounds of honey to a gallon of water.

“A CHEAP HONEY TEA CAKE is made with one teacup of extracted honey, half ditto of thick sour cream, 2 eggs, half teacup of butter, two of flour, scant half teaspoon of soda, one ditto of cream of tartar ; flavour to taste.

METHEGLIN.—“Mix honey and water strong enough to carry an egg ; let it stand three or four weeks in a warm place to ferment ; then drain through a cloth, and add spices to suit the taste.

“HONEY VINEGAR is obtained as follows:—Heat 30 gallons of rain-water and put it into a barrel ; add two quarts of whisky, three pounds of honey, three pennyworth of citric acid, and a little mother of vinegar. Fasten up the barrel, place it in the cellar, and in a short time it

will contain vinegar unsurpassed for purity and excellence of taste."

HONEY VINEGAR.—Take 15 pounds of honey, 8 gallons of warm soft water, one pint of yeast. Mix well, and let it ferment in an open vessel, covered with cheese cloth. After it has fermented for about a week, make a mixture of 6 ounces of alcohol, 6 ounces of chemically pure acetic acid, one-half ounce of tincture of cardamom, in 2 gallons of soft water, and add it to the vinegar that is in a state of fermentation. The tincture is to go into the alcohol before the water is added. If the vinegar is kept in a dry, warm place, it will be fit for use in about a month. The crude commercial acetic acid is detrimental and should not be used.—*Canadian Bee Journal*.

Mr. Allan Pringle gives a substitute for tea and coffee :—Take three quarts of good, clean, wheat bran ; and bake in the oven till it becomes quite brown. Then add one quart of liquid honey and stir thoroughly ; put it back in the oven to bake still more, stirring it frequently until it gets dry, granulated and very brown. Draw it the same as coffee and use with milk and honey, or milk and sugar to suit taste.

HONEY LEMONADE.—Make it in the usual way, using honey instead of sugar ; nothing can be used as a summer beverage that is more grateful and refreshing. Many thousands of pounds of honey may be used in this way, says the *British Bee Journal*, and all the users be benefited.

General Uses.

Besides the foregoing, honey is used in preparations for preserving leather ; in ointments for various purposes, such as for chapped hands, sores, etc. ; and is very largely used by chemists in their many preparations. For

printers' rollers it takes the place of sugar or treacle, doing better work, and making a more durable article.

The reader will thus see that honey is not simply an article of luxury, nor of ordinary diet ; and instead of bee-keepers complaining that there is little demand for their produce, let each endeavour to find some new use for it ; and thus make an opening for the consumption of honey by the ton, where otherwise it would never have been thought of.

A large firm of biscuit makers were induced to start a new biscuit sweetened with honey, and thereupon required two tons of the bees' product weekly. Though we may not often find an opening for it to this extent, there are many ways in which honey is, and can be disposed of, other than for table use.





CHAPTER XXV.

THE ROAD TO SUCCESS

FOR THE BEE-KEEPER AND SMALL FARMER.

UNDER this heading I may be repeating some items already brought before the reader's notice ; but does not the student go through a course of constant repetition before he masters the subjects set out before him? Does the child learn to put his words in writing in a single day, and as he travels onwards towards the knowledge of life, can he grasp the full meaning of life at a glance? No! even man's successes are taken step by step, until at last he can plant his feet firmly upon the heights, and may say "Tis done! Excelsior"!!

The beginner at least, will follow me just here, and when I come to think of the numbers of old friends, and old bee-masters, too, who have assured me they have read every page of the former editions of this work over and over again, I feel that some at least of the older members of the craft, will follow me throughout this chapter.

The Bee-keeper is Looking for Success,

as not simply the final result of his labours, but as the yearly ending to his strenuous endeavours in the apiary. And yet each year may require some different manage-

ment, some alteration from the plans of the preceding season. One year the honey-flow is uncertain ; another the flow is steady and continuous ; while the next may be an exceptionally good year, with a very heavy flow most of the time. The average bee-keeper who is content to super his individual stocks at a certain period, whether honey is coming in or not, and who also takes his swarms as they come, allows the wind to carry him where it will. He takes what he can, more often none at all, where he might have had honey by the hundredweight.

The uncertain season is disappointing to many, as the weather may be hot only for a day or two, and then showery for several days. Constant wet too often means a lowered temperature, and little or no secretion of honey, but

Planting by the Acre Close at Hand

will in a large measure enable the bees to continue gathering during a changeable season. The stock for doing the best work, however, must be bred up to the highest possible standard, and moreover must have plenty of room both for early breeding, and for storing when opportunity offers. Common stock is of little use during such a period and the additional space will prove only a detriment in their case. It has repeatedly been stated by my critics that

Large Frames in the Stock Chamber

are suitable only for very good honey districts, and in good honey seasons ; but, my dear reader, let us have no mistake about this business. The poorer the season, and the more unfavourable the locality, then I assure you there is all the more reason why you should adopt the larger brood frame, which gives the more powerful population at the right time ; yes, and every time.

A Most Instructive Report

of the doings of an Irish bee-keeper was given in the *British Bee Journal* on March 22nd, 1894. The apiarist it will be observed expends little labour over his apiary, and feels assured that his uniform success has been attained *solely through the superior advantages possessed by a large frame*. After describing the apiary the correspondent proceeds—"The hives were all Langstroth make, with frames 16 x 10 ; * * * what struck me as peculiar about these hives, was their size, solidity, and fine finish. * * * I append an account of returns of his apiary in the Canon's own words, from a letter I had from him on the 15th of this month. He states—"My unvarying success through all seasons for the past fifteen years is remarkable ; as I have neither fed, nor stimulated, or requeened, nor done anything to promote greater activity among my bees, so I disclaim all credit for my success, except that of providing room and material to work upon. 1892 was generally a bad season, yet my take of finished sections amounted to 1,792, and from unfinished 3½ cwt. of extracted. Notwithstanding the great interruption of work by swarming, no less than forty out of fifty-five that had made advance with section work having swarmed again and again ; but the late harvest made up lost way. Again, 1893 was a very broken season, so much so that when you visited me I told you I did not expect to exceed 1,400 finished sections ; yet, although the weather continued much of the same character, I obtained over 1,800 finished and 5½ cwt. of extracted ; all of the latter, and 1,728 of the former, I sold to one firm in London at, I may say, a high price, and with high praise as to the quality of both, so I have reason to be satisfied with my results." This is not bad for an octogenarian (considerably over a ton of honey last

season from fifty working hives), and for one who has often no time to attend to his bees when they require it. They swarmed six times last year, five of which swarms he lost, having been obliged to be from home on more important duties than bee-keeping. I have noticed that this apiary has yearly for these last seven seasons, turned out very nearly a ton of honey, and can come to no conclusion but that the Langstroth frame has a great deal to say for such high results. The Canon writes in reply to a query of mine—"with regard to the Langstroth frame, it certainly gives greater scope to the working powers of our stocks, which would be cramped in small standard frames, especially if used in my locality."

This is a remarkable report, and one not equalled by any user of the Association Standard frame. It is a little strange however that after mentioning the size of the frame (16 x 10) both the Canon and his interviewer have fallen into the same error of describing it as the Langstroth frame. Certainly it is of nearly the same capacity as the latter, which however is $17\frac{5}{8}$ long by $9\frac{1}{4}$ deep, and not so readily manipulated as my 16 x 10 "Commercial frame," the latter being of the same size as that which the late C. N. Abbott endeavoured to have recognized as the British standard.

The moral then is that large frames require less attention and are productive of permanent and larger profits! But while a small frame would never allow of such slight attention, had more care been given to the larger frames, some fifty per cent. more honey would have been secured.

During a Steady Flow of Honey

the bee-keeper may be troubled with numerous swarms, and unless he is on the alert, all his arrangements will be sadly discounted. Where he can secure powerful colonies

early, these will get to work in earnest, and give him little trouble ; but the more backward colonies will have most brood just when they ought to be storing heavily, and will be more inclined to waste time in swarming.

Uniting or Doubling

as already explained, will rectify this difficulty, using or rearing for the purpose, young queens to take the place of the older mothers ; and seeing that the united populations have always plenty of room in advance of their requirements.

A Heavy Flow of Long Duration

may not often occur, but during the season of 1893, the bees had a remarkable time in this country : fine steady weather lasting from early Spring until Autumn. There were practically no swarms, and strange to tell, comparatively little honey gathered by the majority of bee-keepers.

With a great many owners it was one of those strange cases of "sliding," of sheer helplessness, and yet a little management at the right time would have rolled in tons of the honey then going to waste because the bees were not numerous enough to secure it.

Only think of a honey flow commencing so early that the bees were hardly roused from their winter's rest, ere they were at work as hard as they could go, from early morning till late in the evening, day after day, week after week, without intermission. And the result—breeding combs clogged with stores, principally pollen, before the brood nest could be expanded, and long before the bees were numerous enough to enter surplus chambers.

What an opportunity was here lost by many ! Stocks on hand, and yet having no power to accumulate the wasting riches offered by Nature's bounteous hand ;

honey everywhere and yet no honey! because the bees had no space wherein to increase their numbers, barely to keep up with the daily losses.

What Was the Remedy ?

In my own apiary I was enabled to procure even more bees than usual, simply by swarming on to starters when the bees could not store in advance of the queen, and thus large populations were secured from the new combs, which under the circumstances could not be pollen clogged, one of the greatest hindrances to rapid breeding during a very fine early season.

In my own case I had to secure increase to meet the requirements of my business, but where honey is the object, the desired result would be secured, under such circumstances by

Uniting Swarms, and Doubling the Stocks

from which the swarms may be made, when in both instances a large honey gathering force is soon secured. The other processes to be followed are clearly set out as shewn herein for "Swarming without Increase," reuniting stock and swarm with the young queen as soon as she is laying freely. In another instance under "Combined Doubling and Swarming" a young queen is given to the united swarms, at, or soon after the operation; while the queen with the doubled stock is not disturbed till later when a young queen with her nucleus is added.

After Accumulation—the Salesman.

There should be no difficulty in disposing of the crop when secured, and then put up in a neat and business-like manner. Some of the most practical bee-keepers who gather hundredweights of honey have never enough for

their customers. A bee-keeping chemist who wrote me not long since says: "I commenced bee-keeping two years ago, and have about twenty stocks. As a help to some of your clients I would suggest they endeavour to persuade some chemists in fashionable watering-places to put a large show of honey in their windows—sections and pots ranging from one to ten pounds, and if properly displayed the sale is very great. I have sold over my counter since July (letter dated April 24th), nearly two tons, not at a low figure, as that would kill the sale, but clover honey at 1s. 3d. per lb., and heather honey at 1s. 5d. Clover sections at 1s.; heather sections at 1s. 3d. I would also advise that any chemist making honey a leading line, should keep one or two hives of bees; he is then in a position to interest his customer who at once has confidence, and moreover, is in a position to answer any questions and silence people who are so very ignorant that they know better than the seller."

The Bees, the Forage, and the Man.

In an article in "*Gleanings in Bee-culture*" for July 15th, 1902, Mr. J. L. Gandy unfolds one of the most interesting experiences that ever fell to the lot of a bee-keeper. He has had as much as £5,000 from his bees within two years, but here are his own words: "I give herewith some ideas obtained during my thirty years' experience as a bee-keeper, the last seventeen of which I have handled them as a commercial pursuit, keeping during this time from 500 to 3,000 colonies, 100 of them being in my home apiary, of which I more particularly write. . . . When I started bee-keeping on a large scale my neighbour bee-keepers did not average a surplus yield of over 50 pounds per year to the colony. I immediately set about improving the bee-pasturage, and my average

yield of surplus for eleven years was 150 lbs. to the colony, and for the last six years it has been 300lbs.

"My net profit for eleven years was a little over 400 per cent., and for the last six years it was 800 per cent. Last year my home apiary, of which I am now writing, 75 colonies (spring count), gave me 407lbs. to the colony."

After saying that he started bee-keeping through his health failing, and being in debt to the tune of 25,000 dollars, he gradually bought up bees until he had 500, presently 2,000, and finally some 3,000 colonies, and meantime had paid off his debts from the proceeds, and had regained his usual health. Then began a series of investments in farm and fruit lands to the extent of thousands of acres, all being by profit from the bees. He found a small hive of little value, and these were soon discarded for large double storied hives.

Large Hives and Judicious Planting

were the foundation stones of his remarkable success. . . . "Bees," he says, "even in an eight-frame hive, generally use the two outside frames on each side of the hive for honey and pollen, and this leaves but four frames for brood-rearing. This will not produce one-sixth as many bees as the colony should contain. I went through a colony having on six 10-frame hives last summer, and it had brood in 32 frames. That hive produced over 500 lbs. of surplus, while the same colony in an 8-frame, with a queen-excluder used, would not have produced to exceed 100 lbs. of surplus. A queen-excluder will exclude the queen, and will also, to some extent, bar or greatly hinder a well-filled hive."

"In conclusion I will say a few words about selling honey, as that is about as important as its production. Of course I could sell my honey at a profit at 5 cents. (2½d.)

per lb., and make plenty of money out of it; but I think it is really worth 15 cents. ($7\frac{1}{2}$ d.), and is cheaper at that price than anything else of its kind we buy to eat; and if I sold at the lower price my neighbours who keep bees, and many of them very poor, would have to go out of the business. I aim to buy all the honey produced I can hear of for miles around, and pay 15 cents. cash for it—just what I sell it at—and this prevents farmers running it in and glutting the market.”

We see then that this large producer is not only generous, but at the same time knows how to manage his market, and this policy is in the interests of all concerned.

AIDS TO BEE-CULTURE.

Shall your occupation be Bees alone? No! Poultry alone? NEVER! Fruit alone? well hardly, unless you have a large capital, for you must wait many years before profitable returns are seen; but grass farming and dairying, or general agriculture, if followed after a reasonable period of practical study, should, in connection with bees and poultry establish you upon a sound basis.

In Establishing a Dairy

your object should be to go slowly, and meanwhile pick out the very best animals for milk or butter as the requirements of your district may suggest. If you buy a lot of inferior animals to start with you are doomed to fail. I have come to the conclusion that for either milk or butter, there is nothing to beat a *good* Jersey cow for small farms. She will yield milk all through her time, and in the end gives as much as the larger varieties which yield heavily for a short time only. Your goal should be the attainment of animals that will *average* 10 quarts of milk daily, or 10 lbs. of butter weekly. Heifers should start

off at 10 lbs. of butter weekly, and this is the kind that will presently give that amount as their average.

Good versus Bad Butter.

One is astounded at the enormous quantity of bad butter made in this country. The country grocers are often at their wits' end to know what to do with it. They must have the custom of such local producers, consequently they may not decline to take the butter, which is frequently sold over the counter for less than they allow for it.

WHAT IS GOOD BUTTER? Strange to say, it is just as easy to make good butter as bad, and far more pleasant is it to deal with. Your grocer will take any quantity right from the door; your neighbours are always eager for it, and the grocer's customers are waiting for it as the cart brings it home, and indeed some of it is never allowed to reach the shop at all. This is the author's experience.

WHAT MAKES THE DIFFERENCE? The sensible dairy-maid puts her brains into the work, into her hands, right down to her finger-tips. First comes cleanliness, intense cleanliness, and care that everything used is scrubbed in every corner, and then thoroughly dried in the open air. Pans, when used must not stand too long, or the cream becomes tainted; and the same trouble arises when churning only once a week unless very great care is used. It is safer to churn twice weekly, and though a proper temperature at churning is an important item, and hot water should never be poured into the cream to make it turn quickly.

The greatest item of all

is the total exclusion of the butter-milk, in the making up. This is one of the serious stumbling blocks to the average

dairy-maid. Careful washing, and minute care in working the butter, will exclude all evidence of the taint-retaining and taint-producing element. When the pats are made up they should break open almost as dry as a piece of bread, with no sign of moisture within. This is the butter that will keep for days, and weeks, and months even; and will make your customers adhere to you without further effort, while they may have hundred-weights of every-day butter at half the price, if they wished.

The Latest Appliances, Pasteurising, &c.,

will not always by any means give the best results. The modest dairy with its old-style pans, may and does often produce the best quality and color in its turn-out. Heating and cooling of the milk as in the Pasteurising process, destroys both the color and aroma of the butter, and then artificial coloring is resorted to. Many farmers' wives have carried out a similar process for generations, in the hope of avoiding taint, but the butter is always the poorer in quality as a result of the process.

Neither will the much-vaunted separator give you the best butter. Oh! yes; I admit the larger quantity, but it is decidedly inferior, including as it does not only the legitimate butter fat, but the smaller grains of cheese fat as well, which ought never to have a place in good butter. And after! What use is the skimmed milk to the farmer, either for his pigs, his poultry, or his calves?

Finally, the dairy should consist of cows giving a high average; and your butter should be of the highest quality, such as will sell itself, and whether you produce weekly, 50lb., 100lb., or double that, you will be put to no worry or trouble in disposing of it.

And in just one little corner of your farm there are the



From a Photo]

Simmins' Method of moving Fowls over the land.

[By Mr. Claude Flight.

bees, prepared to pay the rent of the whole farm, foraging over hundreds of acres, gathering in produce of another kind, paying nothing for the privilege, and doing no one harm because of this gentle art of appropriation.

POULTRY.

Living as I do in a district which sends up nearly 100 tons of dead fattened fowls to the London Market weekly ; and this large demand necessitating the production of over 100,000 store chickens every week, most of them being reared in this same locality, my statements may be taken as representing the truth of the whole matter. I also rear chickens by the thousand on my own place ; fatten them, and send up to market several dozens weekly. The average price secured for these young chickens, which according to the season and the variety used, may be from 4 to 5 months old, is about 3/6. The number sent in each parcel is written upon the invoice supplied by the salesman, and his own label, also supplied gratis, is attached to the 'ped,' and besides that there is no correspondence whatever ; no advising, and no acknowledgement of the cheque received in return.

The cost from the door to the London Market is one penny for each chick ; the salesman charges the same, or a little more for his trouble, according to the rate the birds are sold at, while the empties are returned to the door free of any further charge. These are co-operative advantages without co-operation in fact ; for this is the result of the large number of fowls sent up from the one locality.

And yet with all these advantages I dare not tell any young man he should make his start in life by

Poultry Keeping Alone.

Only too often I have seen this result in lamentable failure, as in the ordinary course must be the case. What

can a young man expect to earn from the keeping of a few fowls. Usually he has but little capital, and starts in a small way, with no previous experience, and at the end of the year, and the next, and the following year, should he stick to his guns for so long a period, he finds instead of satisfactory returns, he is all the time on the losing side of the game.

Even an experienced hand cannot possibly clear more than £100 per annum from 100 selected hens, unless he has also gradually worked up a large connection at fancy prices for choice birds. With 100 hens the expert may rear 2,000 chickens besides selling odd eggs, and these of course require a large outlay in accommodating appliances. Where this number is exceeded of course the labour question comes in, and profits are reduced in proportion. Now

Poultry Farming,

as distinguished from mere Poultry Keeping, implies that a larger area of land is brought under cultivation, and that a proportionate number of cattle will utilize the rich grass and hay produced after the rearing and fattening of chickens, while the cattle grazing among the coops, keep the grass from growing rank, with the certainty of frequently drowning chicks when wet. The constant feeding down, and the larger area allowing frequent change of quarters for the chicks, there is less possibility of the ground becoming tainted, as where the mere poultry keeper with his small area of two to six acres, soon brings upon him his own ruin. The conclusion then is that *as a business*, Poultry Keeping in its restricted sense is not to be thought of, but upon the more comprehensive scale, with 20 to 50 acres and more, Poultry Farming, after a suitable experience has been gained, is a reliable source of income.

Without the said experience, the novice will often invest in Incubators, Rearers, and all the latest appliances, knowing nothing whatever of their intricate uses, nor the difficulties ahead of him ; while disease about which he knows nothing, may ruin his stock birds before he can get a fair start. The result is, from his own point of view, that poultry keeping does not pay, and before twelve months are over, he sells out at a ruinous sacrifice.

FRUIT FARMING.

Nothing can very well be worked to better advantage in connection with bee-keeping ; but from the author's point of view, only the best varieties of apples and pears are worth planting. In cultivating small fruits there is more risk of failure, the labour is a very heavy item, and far more attention is required. Large quantities of small fruits are frequently returned to the grower, as unsaleable, through the immense quantities of foreign fruits, though perhaps inferior in quality, claiming the first attention of buyers, being in greater bulk. Hence the home grower has often had to pay carriage both ways, to and from the large markets, and have his fruit spoiled into the bargain. Therefore, unless one is located close to a large jam factory, or is a maker of preserves himself, it certainly is advisable to cultivate only those fruits such as pears and apples, principally upon quick-bearing dwarf trees, planted something after the fashion of cabbages.

In this case there is no hurry in marketing the fruit, except when some of the early ripening varieties are concerned. Some of the best pears and apples fetch very high prices, and there is no reason whatever, when starting to plant an orchard, why any but the best should be grown, and such will often realise as much as 10s. to 16s.

the bushel, as compared with 2s. 6d. to 5s. for the door sorts from old orchards.

Sound Advice—Avoid all Risks.

Go slowly where you have no previous knowledge of the industry you wish to carry on as a profitable undertaking. And where you have capital to lay out, do not risk it until you have been assured by a course of practical instruction that you are fitted for the business, and that suitable returns will be ensured for the outlay.

What is a Specialist?

A great deal is heard nowadays of making a speciality of any given subject, and devoting one's whole time to that one object. This may answer very well in connection with some ponderous undertaking; and also where mechanics are no more than mere machines, adapted to just one class of mechanism connected with a certain manufacture; though sad is the fate of that man who falls out of this groove, being unable to take up the threads of any other occupation, or even any other branch connected with his own trade or profession.

Far better is it for the average man to have several strings to his bow, and good is the old adage which says, "Do not put all your eggs in one basket." More especially is this the case with rural occupations. The author has been considered a specialist in bee-keeping; so also is he a specialist in poultry farming; in dairying and practical grass-farming; he has been told that no professional joiner could turn out better work at the bench than his own handiwork in that direction; he hopes to become a specialist in apple and pear culture; and he has a firm conviction within, that all of these things can be done well, while neither will clash with the other,

but each will, in fact, help and sustain the combined occupation as a whole. What is undertaken should be done well and thoroughly, so that an accumulation of practice and knowledge will make one a specialist indeed in each department he compels himself to carry through.

Relaxation for the Brain.

When the brain is fixed definitely upon one subject, it is apt to wear down quickly, bringing the body with it tumbling into ruin ; but where variation is offered, the brain gets recreation even out of constant work, and the body is of course benefited by the change. The brain being the nucleus and the centre of life appears to act by relays as it were ; certain cells governing different actions, as is known to be the case as regards the several senses ; and therefore without doubt the same is the case in connection with varying thoughts and motions, the resulting alternations giving complete rest and relaxation in turn to all parts of the brain.





CHAPTER XXVI.

POULTRY FARMING OF TO-DAY.

THE methods of the farmer's wife, with her dozen or two hens, in days gone by, can not compare with the systematic rearing of fowls now adopted. I have already explained how the fowls must be spread out in hundreds and thousands over the whole extent of the farm, in many cases of course right away from the homestead. The land is thus benefited directly, without becoming rapidly stale, as all the coops and rearers are moved almost daily.

Fixed Poultry Houses and Permanent Runs

must be utterly condemned, as having no place in the profitable management of the modern poultry farm. Every pen must be movable, and until the grass crop begins to grow there is no need to confine the breeding fowls, and even then they should be in such pens as are illustrated.

After an extensive experience, during which I have experimented with nearly every variety of fowls, I am forced to the conclusion that

Buff Orpington Hens

are the most suitable for the table, for laying, and breeding

purposes combined. For the table those are crossed with Plymouth Rock, Dorking, or Cochin Cockerels, for ensuring that width of breast, and rapidity of flesh-formation, so necessary for the production of profitable table-birds.

Twenty years ago I formed the opinion that the only profitable way to keep fowls as regards breeding was to

Kill Every Pullet After One Season

of laying. That is no hen is to be held over until the second season. But doing as others did, I still continued to try the second year hen and cock, only to be finally convinced that my earlier convictions were founded upon sound fact.

Consequently every pullet is disposed of as soon as she is clear of any brood she may have from May to July at the latest. This avoids the long, wasteful, profitless period of moulting, with the usual dearth of eggs also following; while the new season's pullets are already laying, and continue to do so all through the winter. Second year hens too are never so good for sitting, being generally too heavy and clumsy, breaking many eggs, and treading on the chicks.

For General Convenience and Profit

the incubator must always be worked with the sitting pullets. The drying box takes the first chicks while the mother is finishing, and the little ones are held until the second day, before being set out, when they are generally fed on plain ground oats every two hours, the food being mixed nearly dry with clean warm water. Milk replaces the water when the birds are a month old.

The coops have a movable bottom board which is removed and scraped daily. This is returned at once in

very damp weather, otherwise it is placed against the coop to dry, and returned in the evening. Where there is no fear of vermin hay made as a nest, without the board will be more beneficial for the quite young chicks.

Foster Mothers.

When these are adopted, not more than thirty chicks may be placed together; the temperature should start at 90°, gradually reducing to 75° after the first week. The chicks should be induced to use the runs freely, with plenty of dry material for them to scratch about, and among which broken wheat or groats should be thrown. The floor of the nest is covered with short hay with as little seed in it as possible.

As the chicks reach the age of three to four weeks in temperate weather, or six to seven weeks at other times, they are moved to cold rearers, and presently, as they grow and fill out these, are again shifted to larger coops or hutches, having evenly spaced slats across the bottom. At fourteen to sixteen weeks they are ready for

The Higglers or Fatteners,

the prices being from 3s. in Spring to 1s. 9d. in Autumn; or when held another month and fattened, they are worth in the London Market 5s. in Spring or 3s. to 3s. 6d. in Autumn.

The Heathfield district requires over 100,000 fowls weekly for its fattening trade, and from one railway station alone, nearly 100 tons of dead fowls go up during some weeks to the markets.

None but young fowls are required for this market, and though the

Cramming Machine

is generally in vogue, I find birds can be fattened just as

well without cramming, and with far less trouble, by my methods of using movable pens, so that the birds do not so readily lose their appetites as when shut off from the ground in raised fattening pens. The profits secured and the methods of sending to market are elsewhere explained.





“FLASH-LIGHTS.”

In reply to repeated enquiries, the Author wishes to state that he has no Catalogue of sundry appliances, and does not supply any of the articles mentioned herein, with the exception of the Conqueror Hive, of which he will be pleased to forward the fullest particulars upon application.

Several members of the family group complain that the half-tone reproduction has changed the original features; but if any reader would like to possess a photo printed from the negative, such may be had post free for 1/- unmounted, or 1/6 mounted, from Mr. Claude Flight, of Little Bines, Burwash, Sussex.

GOING BACK TO THE LAND.—The old-fashioned farmers are falling out, and men with new ideas are succeeding them. The agriculturist of to-day, and of to-morrow, will make a few acres of ground yield a profit equal to, or superior to that of the farmer who worked his hundreds of acres in days gone by. But the young man who thinks he can see an opening on the land (and there are many looking that way to-day), must not think he can grasp the magic wand and command success from the beginning if he has no practical knowledge of the various occupations which may be carried out with a few acres to work upon.

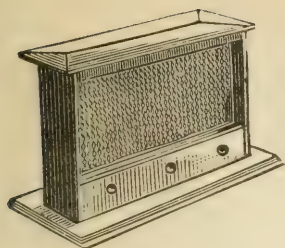


FIG. 60.
Single Comb Observatory Hive.



FIG. 61.
The "W. B. Carr" Metal End.

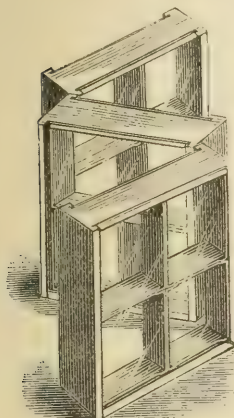


FIG. 62.
Abbott's Comb Honey
Exhibition Crate.

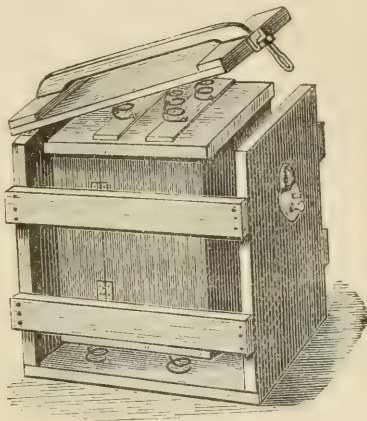


FIG. 63.
Spring Travelling Case for same.

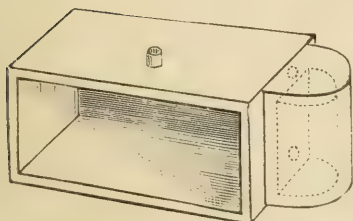


FIG. 64.
Tin Boiler for Queen Lamp Nursery.

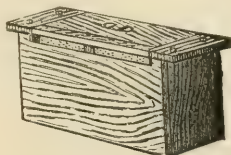


FIG. 65.
Frame Feeder, Self-acting
Process. 1883.

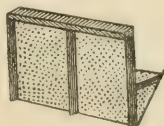


FIG. 66.
The inner portion of same,
shewing Perforated Sugar
Holder and Bee-passage.

Experience must be bought, either through trials and losses extending over several years ; or else by the more effectual and economic plan of working through all the processes on a farm where the various branches of agriculture are carried out in a practical and successful manner.

SPRING STIMULATION.—On page 172 will be found the pith of successful preparation for Winter and Spring. “The *only reliable stimulation* for early Spring breeding is secured by correct Autumn preparation.”

Since this vast and important fact was set out in the earlier editions of this work the expression has been echoed and re-echoed by various writers and some of the journals.

The fact that Foul Brood spores can readily be destroyed *by treating them, in detail, as they germinate in the living temperature of the hive without power of re-production*, was made a law unto bee-keepers by the publication of my propositions dealing with the subject in 1898-9.

The practical bee-keeper has little need to trouble about the negative results shown by experiments with *cold* test tubes and other artificial cultivations. The operators usually miss THE POINT, and entirely ignore the helpful conditions that would be offered by the vitality and high temperature of the bees in a strong colony.

WORKING TWO QUEENS IN ONE HIVE.—A few years ago Dr. Stroud, of Port Elizabeth, South Africa, mentioned in the *British Bee Journal* that he had a system of working any number of queens in one hive or colony, and that he had long practised that method.

Mr. Heddon, of Dowagiac, Michigan, claims to have been the first to point out the possibility of working more

than one queen in a hive. Doolittle and others made some practical demonstration of the fact, but neither of them preceded Dr. Stroud.

Mr. Wells, of Alesford, however, was the first to reduce the matter to practical working as a system in honey production. See *The British Bee Journal* of 1892.

The stock hive is divided by a perforated wood dummy, while the bees from both sides have common access to the supers placed over excluder zinc.

COMING EVENTS, ETC.—The illustrations on page 87 are from the original blocks given in my Non-Swarming pamphlet of 1886. The Fig. No. 01 is the ordinary extracting chamber of the economic hive, while 02 is the set of dividers arranged for placing in the said chamber when desiring, as I then explained, that the extracting combs should be worked perfectly even over their whole surfaces, the better for uncapping by mechanical or other means.

A LIFE INSURANCE can not compare with the planting of a few acres of land to suitable Apples and Pears ; such as command good market prices.

Some of the best Apples realize in ordinary seasons 10s. to 15s. a bushel, while those from the old "mixed up" orchards are worth but three or four shillings. Such is the case also with pears of good varieties ; and the best of it is with most of the apples and some pears, there is no hurry to rush them off to market, as must be done with stone and other small fruits, of course excepting gooseberries.

The greatest profit per acre is secured by selecting bush trees, grafted on Paradise stock, and planted after the manner of cabbages ; and even the tenant farmer, if he

has a long lease will profit largely by planting in this manner.

The owner, of course, has the greatest advantage, and with set out permanent trees at about 27 feet apart in the first place, and these grafted on crab stock. The field is then filled up with bush trees, with about 9 feet between, all ways.

IZAL—THE POSITIVE CURE FOR FOUL BROOD can be procured from your local chemist in 1s. bottles ; or of the manufacturers, Messrs Newton Chambers and Co., Thorncliffe, Sheffield.

LARGE FRAME FEEDERS, for rapid feeding, such as I first described and illustrated in the *British Bee Journal* just about twenty years ago, are most useful in Autumn, and even if the syrup is used cold, the heat from the bees (being all closed in together) very soon raises the temperature of the food to that of the cluster. This point should not be lost sight of.

SLOW FEEDING IN SPRING.—The combs having been fed up almost solid before winter, when the Spring arrives candy in six to eight-pound slabs, hanging in frames, will be found one of the very best methods of slow stimulation. You see these may be placed close to the cluster as a dummy, and of course are always *warm*.

All large owners of bees regard slow syrup feeding as a "tinkering," wasteful process, consuming time and energy which should be better employed. The smaller bee-keeper, usually having some other constant occupation, can even less afford to carry out slow syrup feeding.

The advantages of rapid feeding in Autumn (see pp. 90, 175) can not be contradicted by any progressive bee-

keeper; especially as its benefits are most felt during the trying time of early Spring, dispensing as it does with early feeding with syrup.

“UNIQUE SCHEME TO GET DRAWN COMBS FOR SECTIONS.”—“*Gleanings in Bee-Culture*” for Oct. 15th, 1902, p. 866, shows us another American away behind. Says he—“At the proper time I take away one, two, or three frames of brood . . . and replace them with frames containing starters, etc. I use this comb in the sections . . . Should there be eggs in this drone comb, leave it to cool for a day or two, and they won't hatch.”

Now it happens that Simmins' Non-swarmer plan was, and is, founded upon drawn combs in sections. His pamphlet of 1886 (16 years earlier) was circulated largely in the States, and the sentences above will be found therein, almost word for word—and more important items relating thereto as well.

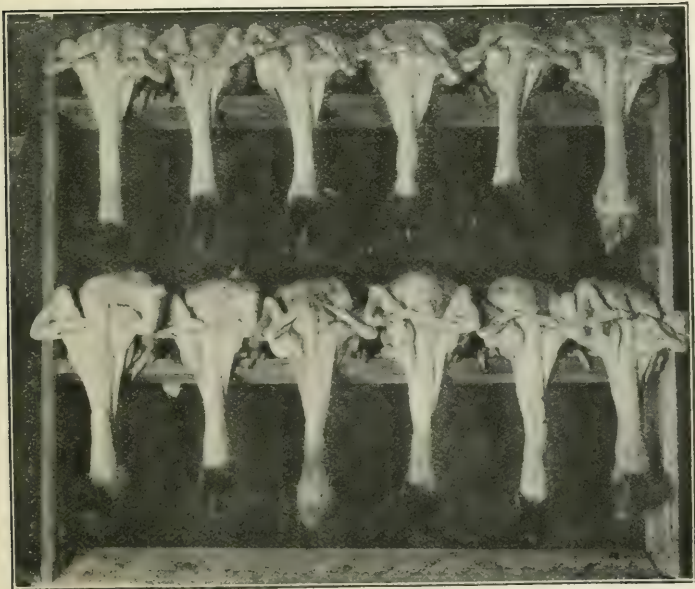
But why go backwards? After getting new combs for the *current* season drawn out for sections, from thin sheets of foundation in the brood nest over it, from starters under it, with and without feeding, over a period of many years, I have now given up all these old methods in favour of working the combs directly into the divided section-holders and placing the three sets of halved sections upon these new combs without any further trouble in fixing.

Glass rail sections were used by the author prior to 1880, with split top rails, and grooves down each inside of the uprights.

V-grooves substituted as a so-called “improvement” upon my plain-cut 3-side-slit sections are detrimental in practice, and necessitate the foundation resting upon the



Feeding Time.



Preparing for Market.

From Photos

[by Mr. Claude Flight.]

bottom bar, when it buckles up, and is inclined to drop from its insecure hold at the top and sides.

Foundation in sections should never reach the bottom rail by a space equal to $\frac{1}{4}$ in. This allows for stretching by the heat and weight of the bees; the foundation remains even all over, and when held within the plain-cut groove will never fall.

NO-BEE-WAY SECTIONS.—My no-way, or plain section was illustrated in my Price List of 1892, and the original engravings are now used for the illustrations on page 167 of this work.

SEPARATORS FOR PLAIN SECTIONS are usually worked with "gate" or "fence" dividers. My own preference has always been for something thicker and stronger, as illustrated by Fig. 70. This has slats secured to the half-holder, and these pieces being a full $\frac{3}{16}$ in., or a bare $\frac{1}{4}$ in. thick, require no vertical pieces.

Mr. S. Deacon, of Knysna, Cape of Good Hope, reminds me he has a trouble I have not mentioned in my work. He complains that it is the rule, rather than the exception, for the bees out there to leave their hives and combs—every bee deserting and going off like a swarm. Once in a while a similar thing happens in this climate, where, through inattention, the bees have not been properly supplied with stores. These swarms are called "starvation" swarms.

It may be that Mr. Deacon thought feeding unnecessary in his locality, but as he states that the combs deserted are perfectly empty, it points to the fact that the bees were arriving at the starvation point, and made the one desperate effort in the hope of finding more favourable pastures.

It should never be forgotten that whether bees are situated in a hot or cold climate, the period equal to a winter's rest is an absolute necessity. But the necessary quietude for ensuring the benefits of that period is only to be attained when the bees find themselves in possession of an abundance of sealed food.

Indeed, in the warmer climate even more food is required, as there is likely to be a longer period of activity before the main honey harvest actually comes on, and without the stored food to fall back upon, the aged bees wear themselves out, without attempting to rear a younger population to succeed them. Hence it is quite possible a colony may in some cases die right out; and such deaths occurring on the wing, a not too observant beekeeper may well think his bees have swarmed out.

The general rules for bee-culture extend to all climes, but when we hear of bees in warm climates yielding comparatively light surplus stores, or even becoming idle, and not working at all, it simply points to the conclusion that the owner does not pay proper attention to their management. While there they require more stores to fall back upon during the time of rest than is wanted in the colder localities; when honey does come in, it must be removed quickly, and an enormous comb space allowed for its daily storage.

On the other hand, in the absence of surplus combs or space, the queens are crowded out, little or no brood rearing can be carried on, and then with no young workers, we meet the opposite extreme—the older workers must die off—this time leaving a fully stored hive, instead of empty combs.

Under very favourable conditions, even with all possible storage room, the brood nest cannot be extended sufficiently to make up for the wear and tear of bee-life.

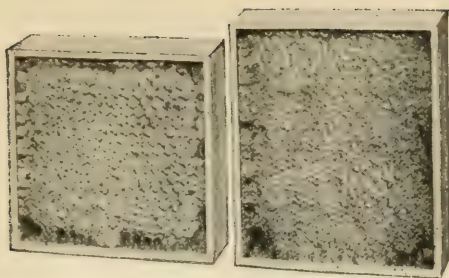


FIG. 67.
Comparison of Tall and Square Sections.
(After Root Co.)

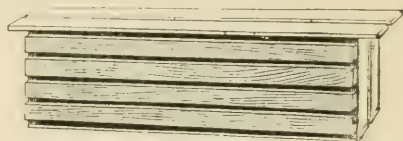
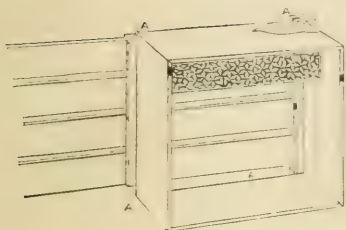


FIG. 69.
Simmin's Divided Section Holder with
slatted divider on one side.

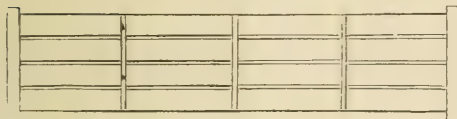


FIG. 68.
The Root Co.'s design of Fence Separator.

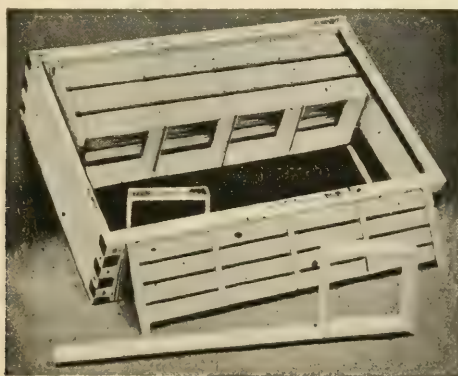


FIG. 70.
The Root Co.'s method of working sections.

Thus we see the reason why a district capable of producing 400 or 500 pounds of honey annually per colony, seldom gives as much as 200, more frequently considerably less.

Under these circumstances, nothing but a judicious system of combined swarming and re-uniting—keeping up the brood supply with the young bees and young queen—will ever give results fully equal to the resources of the district. (See Chapter on “Swarming.”)

Let it be considered that during cold weather the combs are really *unnecessary* except as the store cupboards. Under normal conditions, during late autumn, at the central lower portion of the combs the cells are all empty, just as vacated by the later batches of brood. As the cold weather comes on the bees form upon that portion of the combs, the nearest possible approach to a perfectly unbroken cluster. Some of them occupy the empty cells and rest head to head on opposite sides of the centre wall of the combs, while others crowd between.

Thus they make the best of the situation as they find it; but careful experiments, conducted over a series of years, have always shewn me that the bees prefer to cluster in winter where there are no combs at all to intersect them, and in this situation have less difficulty in maintaining that animal heat so necessary for the preservation of life.

We can therefore meet them half-way as it were, and while not removing the stores can alternate heavy combs with empty frames, thus bringing the cluster into a more compact mass, and entirely avoiding the frequent destruction of the unfortunate outer seams of bees.

The perfect winter cluster is to be seen in the author's method of wintering with the Conqueror Hive. (See Fig. 13).

It has been considered that practical bee-keeping owes much to science, and that scientific bee-keeping owes little to practice. What is science but ascertained knowledge, gained by the continued practice of ages, the good being consolidated, while the chaff has been expelled? Correct practice alone constitutes and establishes true science.

By a careful experiment I have found there are 3,500 worker bees to the pound. Queens will live from three to four years; drones, three months; workers during summer, six weeks, and through the quiet months of winter six months.

Fertile workers are not often troublesome except in the queen-raising apiary. When they persist in laying in nuclei, do not attempt to give virgin queens, but at once supply a good fertile queen on a comb of brood, with accompanying bees; this also being the very best and simplest cure where they are found in stocks of greater strength. The worker deposits eggs in a very irregular manner, sometimes a dozen or more in one cell; but this must not be confused with the work of a young or prolific queen, which because of limited room or too small a number of bees will often lay several eggs in a cell.

Where eggs of fertile workers are placed in worker cells, many of the larvæ die before reaching maturity, otherwise the cappings are much raised above the surface, as with normal drones; and those that do hatch appear equally as perfect as the latter, though, of course, dwarfed in appearance.

While I have had ample evidence to show that bees are able to retard the development of both eggs and larvæ by withholding food; where a colony has been queenless for

more than ten days, the presence of uncapped larvæ, whether in queen cell cups or ordinary cells, may be put down to the action of fertile workers.

Bees winter best with plenty of room below the frames. Many of my own stocks have been wintered with the lower body under the stock chamber, as used for prevention of swarming, with very satisfactory results. The Conqueror supplies this space without a second chamber.

The best show card I have been able to find for the retailer is an Observatory Hive, placed in the shop window. A single comb with bees and queen has proved to be a very great attraction, introducing new customers in quite an unlooked-for manner.

The single-comb observatory is made as illustrated, with a 3-inch space below the comb and three 1-inch holes each side, covered on the inside with perforated zinc for thorough ventilation; while at the same time such darkened recess hides any refuse or dead bees that may drop from above. A comb should be selected not too light nor too dark, about half full of stores; not more than enough bees to cover one side of the comb; having no brood, but a nice yellow queen. If the bees are mostly young very few will die, as the window will be shaded from the sun, and before they are ready to be exchanged young bees are hatching out from the small patch of brood generally started. A suitable darkened crate with convenient handle must be provided for transit. As no brood is inserted in the first instance, this kind of advertising can be carried on in all but the coldest weather.

Many inquire how they are to know when honey is coming in. Examination of the hive will, of course, show

every vacant cell being more or less occupied with the thin newly-gathered nectar. The bees, too, come in with distended bodies, falling heavily upon the flight board. Sometimes the aroma of the incoming stores is distinctly noticeable, more particularly at evening when many bees are ventilating at the entrance, and a perfect roar is heard throughout the apiary. Apart from this, the advanced apiarist has an instinctive feeling that honey is, or is not, being gathered. The state of the atmosphere and his knowledge of surrounding crops tell him at once what to expect. The temperature may range anywhere from 70° to 90° in the shade, but if it continue too hot and dry for more than ten or fourteen days, the amount of honey brought in will decrease daily, unless there happen to be a succession of heavy ground crops coming along, when, the earth being shaded, moisture is still retained. A shower once in a while is beneficial, but frequent rainfalls destroy all chance of a good honey flow, as such induce also a low temperature. Even with fair weather it sometimes happens that the temperature runs too low for the secretion of nectar; but usually if none is stored during a fine season, it implies either that the district is poor in honey plants, or else that there are too many colonies in one place.

THE IMPORTANCE OF YOUNG QUEENS reared expressly for the heather and other late honey harvests; also the rearing of them in late Autumn for uniting nuclei with stocks before winter vitally important methods were first set out in my pamphlet of 1886, and caused considerable comment at the time; but it is satisfactory to find that many bee-keepers are waking up to see the advantages of this plan, though in far too many instances its undoubted benefits are not yet realized.

To be in the highest degree profitable, year after year, a colony must *always* be in possession of a good queen. Hitherto it has been considered that a queen is at her best during her second season ; but in the future, the apiarist who wishes to compete with the times will give his stock a young queen *every year*. Such young queen is not to be inserted either in the spring or usual swarming time ; but by observing the "Tenth Method" it will be seen that the whole matter is reduced to a system.

PRESERVING COMBS.—Can any bee-keeper who uses the close-fitting, non-ventilated floors with hives in common use ; can he, I repeat, honestly say that the combs in his hives during winter, and early spring which may not be covered by the bees, are free from deterioration by the action of dampness and mould ?

A great many combs are injured yearly in such hives, but where the Author's non-contact chambers are adopted every comb remains perfectly dry and sound. Undoubtedly, therefore, the great question of ventilation both in summer and winter is now, *and finally*, solved by the use of his hanging chambers.

PLANTING FOR BEES.—As a common field crop, clover is usually sown with, or over corn in spring ; but from the bee-keeper's point of view I have modified this rule by arranging for sowing the fine plots in August or September. The clover plant really comes the stronger at this season of sowing ; it is not choked by summer weeds, and practically a year is saved. Where stock is reared largely, a combination of the two seasons of sowing would probably be necessary.

JERSEYS FOR PROFIT. Just note the two typical Jerseys shewn as "Mother and Daughter." The mother, four years of age; the daughter just turned two, and one other Jersey cow aged seven, grazing on a meadow of four acres, for a period of seven months averaged thirty-five pounds of butter weekly. This with the skim-milk would amount to a profit of over £2 weekly for the seven months.

Other stock was also grazing on the same field during that period. Why then do we hear so many complaints of farming not paying? The above shows a produce of £14 per acre for the seven months; but the field was at one time very poor, and a judicious treatment with artificial manures, and the penning of fowls over it, finally brought the land into a good condition of fruitfulness.

A banking account at twenty per cent. interest is not to be compared to the proceeds from good land, and from high-class cows fed upon it. Poor land—allowed to remain poor—and inferior stock, will on the other hand ruin any cultivator (?) of the soil.

SYRUP WITHOUT COOKING.—A self-acting principle was introduced by me some twenty years since, was illustrated in my *Non-Swarming Pamphlet*, and described under three forms: (1) The "Amateur," all metal and circular, holding 9lbs., for top of the hive; (2) The "Frame" feeder, all wood, except the perforated sugar holder inside, holding about the same quantity; and (3) The "Commercial," a double compartment feeder of full size, to go on top of the hive, and holding anything from 20 to 40 lbs. of syrup; all arranged for the simple process of putting in the usual proportions of sugar and water, when with no further attention the whole is shortly reduced to syrup.

The sugar must be *suspended* in the water by means of the perforated compartments as shown in Figs. 31, 32, 50,

52, 53, 69 and 70 ; thus allowing a free circulation of liquid under.

I have frequently used a large cylinder, holding nearly 2 cwt., constructed in a manner similar to the feeding-can arrangement, Fig 52, except that a treacle valve at bottom was provided for drawing off.

It is only when we come to consider the immense saving of time and labour in connection with this method of syrup making, as also the plan of feeding dry sugar (Fig. 06), that one sees the possibility of conducting out-apiaries to the greatest advantage,

THE WINTER CLUSTER will generally be seen located towards one or other of the outside walls at the ends of the frames, and starting from near the floor at the commencement of cold weather will be found to slowly advance upwards as the stores are consumed close at hand. The illustration, as represented in Figs. 33-36 will shew clearly enough that the cluster is formed upon the empty cells wherefrom the later batches of brood were hatched, and it is at once evident the larger frame shews decided advantages in that an abundance of food is present on each frame occupied by the bees, thus ensuring that restfulness so necessary for the well-being of our little friends, and avoiding the too frequent occurrence of starvation while the distant (smaller) frames may be well stored.

The situation of the cluster is represented by the letter **C** ; the stores by **S**.

It should not be forgotten that before the "quilt" or frame covering came into use, most hives were constructed with a bee-space between the frame bars and the crown-board. When the close-fitting quilt was adopted this space was closed, to the detriment of the bees, in that the cluster could no longer communicate at the spot most favourable

for the purpose; consequently the outer seams of bees frequently perished.

This trouble can always be avoided by placing one or two $\frac{1}{2}$ -inch strips of wood at right angles to the frames, and between them and the quilt. Candy, when necessary, will do the same: so also will an additional shallow storey placed above; and this latter will ever be found to give very desirable results.

THICK TOP BARS.—In former editions I have drawn particular attention to the $\frac{5}{8}$ -inch top bar, the thickness used in my apiaries since 1878. They do not sag at the centre; do away almost entirely with comb attachments above; and help to keep the queen from ascending to the supers.

EGGS DELAYED IN HATCHING.—It does not follow because eggs are deposited in the cells that the warmth of the hive must hatch them. Such is far from being the case; no eggs will hatch until the workers first surround them with the preparatory food upon which the tiny grub is to feed.

Consequently, in spring, eggs laid in drone cells are sometimes not brought to the hatching point for days or weeks after the usual three days period. There they remain just as deposited by the queen, and as soon as favourable weather appears the food is supplied and they are allowed to hatch.

Eggs that should produce workers are sometimes held over in this way in early spring; but more frequently it happens with these in late autumn.

WIDE OR CLOSE-END FRAMES have been through various experiments under my hands since '75, and in '78

I was awarded a Special Prize for a hive of this class at South Kensington. The main features were that the frames could be inverted as a whole ; they had an inner side rail, while the outer ends were put on in reverse position, so that the combs could lay close against the cage of the extractor. Another point was the arrangement of a crate of sections *under* the brood chamber, such as the Conqueror hive now has situated in a more convenient manner for working.

Quinby had great success with wide or close-end frames ; Capt. Hetherington, one of the largest bee-keepers in America, use them exclusively ; and, besides others, we have Mr. Heddon, with his shallow chambers, unknowingly following the character of the far-famed Stewarton horizontally divided brood chambers.

With these frames the great disadvantage has been not so much the actual contact of the frames as the fact that screws or springs were necessary to keep all up close together to avoid the trouble caused by the contraction or expansion of the wood.

Metal ends for keeping brood frames equi-distant are as illustrated at Fig. 61. These were the invention of Mr. W. B. Carr, and are so cheaply produced by several manufacturers that the cast metal ends have been driven out of the field. Their formation permits of using frames at two distinct distances from centre to centre, though the fact is seldom taken advantage of, and when once placed on the frames the set distance is generally retained.

The Author uses no metal ends, finding them most inconvenient ; as doubtless most bee-keepers would do, if they once tried to do without them.

ARTIFICIAL HEAT!—What numerous and costly

experiments have I not conducted in this direction, extending over many years? It is both a destructive and a helpful process. Hurtful if applied before warm weather is really near at hand; greatly beneficial if used in a proper manner, only after the bees have once hatched plenty of young.

Greenhouses, coal-stoves, paraffin stoves and lamps; all of these have I brought into requisition, and in the light of past result all are condemned.

A joyous sight though it was to an enthusiast to stand in summer heat at mid-winter and watch the hundreds of busy workers at the artificial pollen, and rushing with their loads to the hives as though they made sure summer was upon them.

But judged by the stern light of facts it remained a pleasant experiment only, for of what value were those stocks after the excessive unseasonable loss of life and consequent failure to pick up when the second and real summer approached!

And yet artificial heat gave me some of the most forward stocks I ever possessed—they were up strongly in the supers by the end of April. But it was not until March was well on the way that they were placed upon and carefully packed round with long stable manure. They did well right along, and being exempt from all outside changes, there was nothing to hinder their very rapid progress.

While I am not an advocate of double packed walls to the stock hive in winter, nor such arrangement even for summer, yet where *shade* is provided by an independent outer case during hot weather, very great progress is made by the bees,

I have quite recently had placed before me a sample feeder, which is probably the only one of its kind, for top feeding, which permits of filling from the top without removing it from the hive, while at the same time having regulated feed holes in the bottom of the vessel. This (the Wilkes Convertible) feeder can be adjusted for slow, medium, or rapid feeding.

The "Wilkes" being a metal feeder, and its base set up from the frames, warm syrup is of course a necessity should feeding be desirable in cool weather. I am of the opinion that the feeder would be more certain in its action if used as two separate vessels with a solid, instead of a movable pan bottom, for slow and fast feeding respectively; while in many cases the slow to medium action would be all-sufficient for owners of a few colonies.

Dear Reader, as a parting sentence, allow me to remind you that bee-keeping cannot be carried out extensively by everyone. Success on a large scale is not to be attained except by diligent study and hard work.

The earnest and enthusiastic worker will find the pursuit give a substantial addition to his income if he will strive to keep only young queens bred from stock showing persistent good qualities; while additional security is offered if planting can be carried out in a systematic manner; and also where other suitable occupations are made to fit in to the best advantage.

I trust that herein you have found I do not merely offer you the usual and well-nigh worn-out advice: "Keep

your stocks strong"; but instead of then leaving you to find out for yourself how it is done, I have placed before you the definite methods that will enable you to attain the desired end.

FINIS.





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ERRATA.

Page 385—Fence dividers. For fig. 70 read 69.

Page 264—Queen Nursery. For fig. 68 read 64.

IZAL DISINFECTANT

(Non-Poisonous).

NO other has been *proved* to be so efficacious. ONE Pint makes TWO HUNDRED Pints reliable Disinfecting Fluid. Four times the strength of Pure Carbolic Acid.

Free from danger, being neither Poisonous nor Corrosive.

**Officially adopted by His Majesty's
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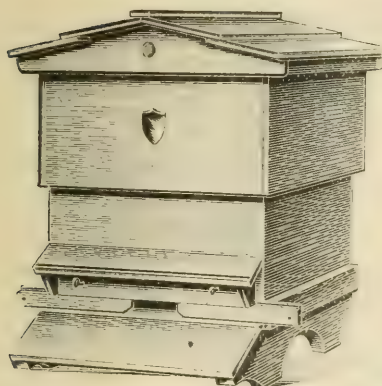
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